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The
Macrolepidoptera
# of the World

A systematic description of the hitherto known Macrolepidoptera

edited in collaboration with well-known specialists

by

Dr. Adalbert Seitz, Professor

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I. Division:

The Macrolepidoptera
of the
Palearctic Fauna

2. Volume: The Palearctic Bombyces & Sphinges.

With 56 coloured plates (2489 figure).

Preface.

When in 1909 the last number of Volume I of the "Macrolepidoptera of the World" had appeared some critics expressed a doubt as to whether an undertaking of such magnitude could be carried out on the scale of the first volume.

The friendly, even enthusiastic, reception accorded to Volume I has decided the fate of the entire work. From that moment there was nothing to hinder a rapid publication, and both editor and publisher have strenuously endeavoured to carry out the plans set forth in the preface to Volume I.

As the principal item in our programme was comprehensiveness, we have attempted, as far as the limited space would allow, at least to indicate all that is of value in determining and classifying the species, as well as to mention biological details. Frequently also remarks have been added which have reference to the relation of the Lepidoptera to the environment, food, protective measures, injuriousness, etc. Although the size of the present volume has hereby been increased, the volume containing 100 pages more than its predecessor, the number of parts has nevertheless been restricted to thirty, as some of the parts consist of several sheets of text. It has thus been possible to conform to the wishes of collectors desiring a comprehensive work on the hybrids of *Sphingidae* from the pen of the most experienced writer on this subject.

The second point mentioned in the introduction to Volume I was rapidity of publication. The financial question for the entire work having been solved by the reception accorded to Volume I, it was possible to publish as rapidly as time would allow. The praiseworthy and strenuous efforts of the publishers enabled us to issue no less than 488 parts since the publication of the first volume (Nov. 1909), viz.:

Palearctics		Exotics	
46 German	parts	102 German	parts
80 French		120 French	
32 English		108 English	

which, for about three years (940 working days) works out at not quite two days for each part. Although I do not anticipate that there is anybody who does not appreciate such a performance, I hope nevertheless that readers will remember the rapidity with which the work was issued if any slight errors of omission and commission have escaped our vigilance.

We have been blamed by some reviewers of our work for not going beyond our original intention of providing a comprehensive handbook for collectors and Lepidopterists by examining the collections of Museums and private Entomologists for new species and by continuing the subdividing of forms and the naming of aberrations already more than sufficiently carried out by others. We accept this reproof with the reservation that we did not follow this course on account of expediency, but because we assumed that the majority of readers would not be pleased at the introduction of numerous new forms and the minute subdivision of old ones.

I cannot leave this subject without attempting to explain why another wish, which was more generally expressed, had to be ignored. Since the conclusion of Volume I nearly 150 weeks ago (Nov. 1909) almost exactly 150 parts have been issued in each language; in the German edition, for instance, parts 56 to 102 of Division I and 41 to 143 of Division II, i. e. one part in each language every week. Why, we are asked, is not a German part issued regularly every Monday, a French one every Wednesday, and an English one every Friday, and why are periods of extreme haste followed by pauses of weeks or even months?

The answer to these questions lies in the different methods of our scientific co-workers. It would certainly not be unnatural, on receiving a large manuscript, to issue it at regular intervals. The letterpress, however, is not printed and revised according to parts, but according to chapters; when a printed sheet is ready it is dated and must at once be issued. We have also to consider the authors, whose manuscript must not be delayed, lest they be anticipated by another's publication.

It is therefore impossible to give beforehand the exact date of publication of each future part. Only this much can be said today, that, after the Palearctic Noctuids with the exception of the two last and rather small groups (end of the Quadrifidinae and Hypeninae) have appeared and after four of the six groups of Geometrids have been issued in the three parts following, the Palearctic portion of the work will shortly be completed, so that the Exotic division can be issued much more rapidly.

The third point at which we aimed was to render the work inexpensive for the purchaser. Whether we have succeeded in realising this is for our subscribers, and not for us, to decide. The work was meant to be in reach even of collectors of only very moderate means. The price of the rather large second Volume has worked out at less than 30 shillings for subscribers, and by comparing our text and plates with those of other equally cheap publications the reader must judge for himself whether the quality of the more than 3000 diagnoses and nearly 2500 figures justifies this sum. But while doing so he must not forget that the price for subscribers of the two Palearctic volumes still in the course of publication will be considerably less, as they are condensed into very few parts. The subscribers price for the entire volume of Geometridae (dealing with about 3000 forms) will scarcely exceed 10 shillings.

We therefore conclude Volume II in the confident expectation that the same reception will be accorded to it as to Volume I. The lenient and considerate criticisms the work has so far received leads me to hope that its modest aim of being essentially a work of reference has been recognised and appreciated. But just as in the introduction to Volume I I had to meet the charge that the beauty of the plates suffered through so many figures representing only half a specimen, so again today I have to answer a criticism arising from misconception. It has been considered a grave fault that the composition of the various paragraphs is not uniform throughout the work. This allegation was founded on the absolutely erroneous premise that all forms dealt with in one paragraph were always considered to belong to the same species. It is, however, quite outside the province of this work to determine the degree of relationship of one form to another. A paragraph is meant to deal with forms closely allied; it is not my intention at all to influence the personal opinion which any one may have on the above questions according to his own experiences. Had we entered into the disputes about the specific distinctness of forms, etc. — which anyhow appear to me rather futile —, the work would have become much more bulky and scarcely as useful. Naturally, in by far the greater number of cases the forms are so arranged that those placed together in one paragraph as being closely allied or similar are in fact forms of the same species. But where this is not the case the reader will please remember that the "Macrolepidoptera" is a work of reference and not a series of critical monographs, and further, that where the text gives more information this is a voluntary contribution on the part of the author.

Just as far removed from the scope of the "Macrolepidoptera" was a decided position with regard to the question of nomenclature. We could not make up our minds to follow implicitly the preliminary code of so-called "international rules of Nomenclature", and how well founded our scruples were has been proved by the overwhelming majority by which this code has been rejected — in some countries by 90 per cent of the votes. We have adhered essentially to the law of priority and only admitted exceptions to this rule for very strong reasons, i. e. if the strict application of priority would have changed long-established names. But the opinion of those readers who do not admit any exceptions to the law of priority has also been taken into consideration inasmuch as a slight alteration of our original plan has enabled us to give an extensive synonymy and to include the synonyms in the Index to each volume.

In the sixth preface to Vol. I of the Macrolepidoptera I proffered our hearty thanks to all who have assisted in the undertaking, and now I have again great pleasure in thanking particularly the authors of the letterpress of the various groups, many of which presented great difficulties. We are no less indebted to the owners of collections who gave most efficient help by lending specimens and whose names have been mentioned in Vol. I; also to our lithographers, Messrs. Werner and Winter, of Frankfurt a. M., whose plates, without laying any claim to artistic and decorative effect, can bear any comparison as regards utility; and last but not least I must thank the publishers of the work, who have strenuously endeavoured to comply with even the most exacting demands. Both they and the editor will try to prove their gratitude for the appreciation shown in the urgent demands of their readers for a continuation of the work by producing the separate parts still more rapidly than before, though during the last three years the time elapsed between the issue of any two parts was on an average less than two days.

Before I close this preface to Vol. II I should like to repair an omission caused by my absence abroad when Vol. I was concluded; I mean a statement of the reason for our change of programme. The original plan was that the first 100 parts should be almost exclusively Palearctic, so that the Palearctic division of the work would conclude with part 100 issued in 1909. But the very numerous subscribers to the much more important Exotic division — there being no similar works on Exotics in existence — protested, demanding that at least the larger butterflies of the Exotic fauna should be dealt with first. Especially the subscribers residing in Africa argued that on account of the climate their sojourn in that continent usually only lasted a few years, and that a work issued in parts extending over many years would be of little use to them. This argument is so sound and the request so reasonable that we have attempted to conciliate each party by publishing the Palearctic parts alternately with those dealing with the families of the larger Exotic Rhopalocera, the latter being now also concluded with the Nymphalids just issued.

Darmstadt, Sept. 30th, 1912. ADALBERT SEITZ.

II. VOLUME:

BOMBYCES

AND

SPHINGES

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Phalaenae, Moths.

The large division of Lepidoptera called Phalaenae, which name is completely synonymous with the designation «Heterocera», is not equivalent to the «Diurna». The term Moths comprises far more diverse elements, and a general characterisation is as difficult as it would be futile. Whereas all butterflies have a well developed tongue, the mouth-parts of Heterocera are sometimes used as a sucking organ, sometimes they are unfitted for that purpose; they may be reduced to a very great extent or even be suitable for biting. The antennae also exhibit all modifications imaginable, and the fore- and hindwings may have the strangest relative proportions, here the forewing being the main organ of flight and there the hindwing, and both may be completely absent. The caterpillars too bear every conceivable kind of external covering, the skin bearing warts, buttons, peg-like projections, thorns, brushes, filaments, pustules, wax-wool, spikes, and even stinging organs. The number of feet also is different, varying from 3 pairs fit for crawling to such perfection that almost the whole underside is modified into an organ of adhesion. Also in the metamorphosis we meet with great differences; for instance, species are known which have a kind of prochrysalis. In respect to all details we must therefore refer the reader to the characterisation of the various subdivisions.

I. Section: **Bombyces.**

The Bombyces, which Linné put behind the Sphinges as a group equivalent to the latter, are closely associated with the Hawkmoths in the arrangement of the present work. The Sphinges stand as a separate family in between a number of different Bombycid families which, following old custom, are here united under the little suitable collective designation of Bombyces. However, it is not possible to arrange the animals in such a way that they form a continuous line; and since we have nevertheless to deal with the various species one after the other in a continuous series, unnatural separation of close allies is often unavoidable. We abstain also from giving a characterisation applying to all the families of Bombyces. — The number of hitherto known forms is about 10000. They are distributed nearly over all the countries inhabited by Lepidoptera, but do not extend so far north as the Butterflies. On remote islands the number of endemic forms is mostly exceptionally small, as compared with that of the Diurna, Sphinges and Noctuae. Tropical mountainous districts appear to be especially favourable for the development of a great variety of forms of Bombyces. Though often incapable of taking nourishment from flowers, the Bombyces fly actively about — as a rule late at night — and nearly all the species come to the light. The organ of smell is often more strongly developed in the ♂♂ of Bombycids than in any other group of Lepidoptera, the distances from which they are able to find the ♀♀ being often astonishing. — We must state, however, that the group of «Bombyces» known as such to collectors since Linné's time has been adopted here only in order to have a name comprehending all the Heterocera which do not belong to the Sphinges, Noctuids, Geometrids and Micros. — Seitz.

1. Family: **Zygaenidae.**

First (anterior) submedian vein present in both wings:[1] forewing without areole. Frenulum and retinaculum present. A more or less distinct vein in the cell, extending from the angle of the discocellulars basad; costal vein of hindwing rarely anastomosed with the cell, mostly separate, parallel with the cell, and connected with it by a short oblique bar (= SC^1) in or beyond middle. Ocelli usually present. Claws of

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[1] Some exotic forms excepted.

tarsi without tooth. — Egg above a little impressed, the surface very feebly sculptured. — Caterpillar with 16 legs, head small, retractible into the prothorax; setiferous warts on all segments: the prolegs bearing a halfring of hooks. — Chrysalis in a cocoon, abdominal somites all (?) free. According to Doherty's observation the larvae of a curious long-tailed Oriental species of *Himantopterus* live in the nests of white ants. — Day-flying insects, mostly of bright colours, metallic gloss being prevalent, but there are also sombre brown and yellowish forms without gloss. They have a slow flight, and many sham death on being touched. The soft body contains acrid fluids, which protect these tenacious insects against the predations of their insectivorous enemies. They sit mostly lazily on flowers, only in hot sunshine become the ♂♂ of many species more lively, swarming about in a straight flight. In pattern, colour and shape many *Zygaenidae* agree closely with other Lepidoptera to which they are not nearly related, especially members of the families *Geometridae, Syntomidae,* and *Arctiidae,* as well as *Pieridae* and *Danainae.* The similarity between the Palaearctic Zygaenids and Syntomids, especially in the outline and the relative size of the wings, was in fact the main reason which induced the older authors to regard these insects as being closely allied to one another and therefore to unite them in one family. However, the small *Zygaena*-like wings are a character acquired independently by these two families, and found only in one portion of the whole family *Zygaenidae.* The more original Zygaenids are doubtless the *Chalcosiinae* with their broad wings and strongly pectinated antennae, though the *Chalcosiinae* on their part are in other respects more specialized than our true Zygaenae. It is a general fact met with everywhere when studying the phylogeny of animal forms, that a species or a group of forms (genus, family, etc.), more generalized in some characters than a second species or genus (etc.), is much more specialized than the latter in other organs. This fact is very prominent among the Zygaenids.

The Palaearctic *Zygaenidae* are divided into three subfamilies, which can easily be distinguished as follows:

1. **Phaudinae.** — Tongue reduced, very weak or absent; body rough-hairy.
2. **Chalcosiinae.** — Tongue present, rarely absent, in the latter case the abdomen not rough as in the *Phaudinae;* body more or less metallic; foretibia without spur; hindtibia with apical spurs, but without middle spurs.
3. **Zygaeninae.** — Tongue present; foretibia with spur.

A. Subfamily: **Phaudinae.**

Tongue reduced. Palpus mostly small, often indicated only, rarely rather large, but in this case rough-hairy like the whole body. Most species are entirely devoid of metallic colours, only the tibiae are sometimes slightly metallic green. Scales of the wings hair-like, rarely truncate. Black, brown, and yellow or red are the colours of this subfamily. — Hardly anything is known about the former stages, with the exception of a Javanese species. In the Palaearctic Region there occur 6 species, which belong to 3 genera:

1. **Pryeria.** — Submedian veins of forewing connected with one another by a bar, which is occasionally interrupted.
2. **Phauda.** — All subcostals of forewing from cell, or 3. and 4. stalked.
3. **Pseudopsyche.** — The 3.—5. subcostals of forewing stalked, the 5. proximal of the 3.

1. Genus: **Pryeria** *Moore.*

Body rough-hairy: abdomen of ♂ with long apical tufts. Palpus just vestigial. Tongue absent. Antenna long-pectinate in ♂, dentate in ♀, distally slightly incrassate, flattened below, pectinations non-scaled. Tibiae without spurs. Wings Syntomis-like in outline, transparent, being covered with thin hairs; costal margin of forewing incrassate, costal vein distally connected with edge by short veinlets, 1. subcostal represented by an incomplete vein which does not extend to the cell, 3. and 4. subcostals stalked, cell very narrow from base to middle, subcostal and median nervures touching each other, submedian veins connected before the middle by a bar, which is occasionally interrupted; costal vein of the small hindwing distally anastomosing with cell, 5 veins from cell, anterior angle of cell much more produced than hind angle. — Former stages not known. The caterpillar feeds on «Masaki» according to Pryer. Like many other Zygaenids sporadical, sometimes found in great numbers on a tree, and not met with again for a long while.

sinica. **P. sinica** *Moore* (1 a). Body black; the mesothoracical tegula and the greather portion of the abdomen dirty orange-yellow. Wings covered with thin black hairs, base pale yellow; forewing broader in ♀ than in ♂. — Japan and North China, not rare in Central Japan, found by Pryer in great numbers in the neighbourhood of Yokohama.*)

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*) I met with this species flying in great numbers around a tree in a garden of the Bluff near Yokohama. Whole swarms of ♂♂ gathered around the ♀♀, which were sitting at the tips of some branches. The ♂♂, on the wing, resembled exactly a sawfly of the Tenthredinid genus *Lyda.* — Seitz.

2. Genus: **Phauda** *Walk.*

Body rough-hairy, abdomen of ♂ with long tufts of hairs at the apex of the abdomen. Ocelli absent. Palpus and tongue present but small. Antenna setiform, pectinated in ♂, the pectinations short and those of each segment fused together to form (in ventral aspect) an angle, in ♀ non-pectinate. Foretibia with spur; mid- and hindtibiae with a pair of very short apical spurs. Wings elongate; forewing with 4 or 5 subcostals, all from the cell, or 4. and 5. stalked; costal vein of hindwing separate from cell, connected with the subcostal vein by a bar proximally of apex of cell. — Larva on Ficus and Terminalia, anteriorly broader than posteriorly, with a brown dorsal stripe which is anteriorly dilated, sides white or yellow. Cocoon hard, barrel-shaped, yellow, with brown and red stripes. — A genus of the Oriental Region, represented in the Palaearctic fauna by three species occurring in China. The perfect insects resemble the Coleopterous genus *Lycus*; when touched they curve the abdomen upwards, the anal brushes projecting like a pair of forceps, reminding one of earwigs.

P. triadum *Walk.* (= fortunei *H. S.*) (1 a). Reddish yellow, the centre of the upperside of the abdomen, the long apical tuft and a large patch at the apex of the wings black.[*] — North China; Kiukiang, found in June. *triadum.*

P. pratti *Leech* (1 a). Body black; abdomen and underside of thorax golden yellow. Forewing orange-yellow, distally brownish grey, the apex being pale grey. Hindwing semitransparent, distal half black. — I-chang am Yang-tse-kiang, where PRATT discovered the ♂ in July, also at Moupin and Wa-shan, West China, in June and July. *pratti.*

P. lanceolata *nov. spec.* (1 a). Body reddish yellow, frons, forecoxa, a stripe on abdomen and most likely also the antenna black. Forewing long, without indication of an anal angle, brownish black, extreme base yellowish red, 2. and 3. radials on a short stalk. Hindwing transparent, with darker edges, 2. and 3. radials on a long stalk. — I-chang, one ♂ (without antenna) in the Tring Museum. *lanceolata.*

3. Genus: **Pseudopsyche** *Oberth.*

Body long-hairy. Tongue and ocelli absent. Palpus rather long, rough-hairy. Antenna setiform, long-pectinate in ♂, the pectinations without scales, in ♀ the antenna very thin, each segment produced into a point on underside. Foretibia without spur; mid- and hindtibia with a pair of short apical spurs. Wings distally transparent, sparsely clothed with small scales. Forewing with 5 subcostals, the 3., 4. and 5. stalked, the 5. nearest the cell, the 2. and 3. radials close together, both median branches proximally of cell-angle; costal vein of hindwing anastomosed with the cell, except base, becoming free proximally of apex of cell, 1. radial and subcostal on a long stalk, 2. and 3. radials from a point or on a short stalk. — Amurland and West China.

P. dembowskii *Oberth.*[**] (1 b). Body black, the hairs mostly yellowish grey, the mesothoracical tegula and the abdomen below at the sides and above at the apex red or yellow. Wings transparent, veins black, base yellowish or red. Two forms are known. — The form described by OBERTHÜR is from Askold; the base of the wings and the abdomen are yellow. — The other form, **oberthueri** *Stgr.* (1 b), has these parts red. Occurs on the mainland in May and June near Wladiwostock, Raddefka and Chabarofka, being doubtless more widely distributed in the southern districts of Amurland. *dembowskii.* *oberthueri.*

P. yarka *Oberth.* (1 b). Appears to belong here according to the figure. Smaller than the preceding species. Head, thorax, apex of abdomen and base of forewing pale yellow. — Ta-tsien-lu, found in May. *yarka.*

B. Subfamily: **Chalcosiinae.**

Tongue and palpus present; the latter separated from the eye by a genal stripe which is usually scaled. The stripe of scales bordering the eye posteriorly is broad, bearing above thin erect hairs. Frons usually strongly convex, prominent. Antenna in ♂ and ♀ pectinate, at least at the apex. Foretibia without spur; mid- and hindtibiae with a pair of short spurs at the apex. Anal segment of ♀ mostly modified into a long ovipositor. — The species of this central subfamily of Zygaenidae are nearly all more or less metallic green or blue, being mostly marked with red, yellow or white. This subfamily contains very diverse-looking forms, which, however, are all easily distinguished from the *Zygaeninae* by the absence of the foretibial spur. The species are partly very variable, even in the venation of the wings, the sexes being in some genera so different that ♂ and ♀ were placed in different genera until quite recently. The subfamily is most abundantly developed in the Indo-Malayan Subregion. Many of the genera occurring there extend northwards into the Palaearctic Region. In habits the *Chalcosiinae* agree closely with the Zygaenae. The larger, broad-winged species have mostly a still heavier flight. Some dark-coloured forms frequently rest on the stems of trees. The bizarre pattern of many species renders it probable that we have here to do with an imitation of spotted blossoms The forms which are copied by Geometrids, Arctiids and other Heterocera, are generally much rarer than the mimics. This may partly be due to the *Chalcosiinae* taking less easily to the wing and therefore escaping the eye and net of the collector. The paucity of specimens of *Chalcosiinae* as compared with the frequency of *Geometridae* mimicking them, for instance in New Guinea collections, is very striking. However, the forms resembling Euploea and Danais are generally very common, as are also the fulguriform species. — The short thick caterpillar bears narrow, prominent, setiferous warts on all somites, except the small head. The pupa lies in a usually dense cocoon which is fastened on the upperside of a leaf that is more or less rolled in; at emergence of the imago the anterior third of the pupa protudes from the cocoon.

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[*] This species, which I found in China in September, resembles, when crawling about with the wings closed, exactly a bug of the Hemipterous family *Lygaeidae*. The large black apical patch of the wings represents the membranous portion of the Hemipterous wings. The same applies to *Phauda sumatrensis Walk.*, according to information received from Hofrat B. HAGEN. — SEITZ.

[**] In the text of the German edition and on the plate the name is misspelt *dembrowskii.*

4. Genus: **Aglaope** *Latr.*

Tongue absent. Palpus small, but distinct. Antennae pectinate in both sexes, pectinations sparsely scaled, short in ♀. Foretibia without spur; mid- and hindtibiae with an apical pair of short spurs. The 1. subcostal of forewing not far distant from the 2., the 3.—5. stalked together, the 3. branching off close to cell. Costal vein of hindwing anastomosed with cell beyond middle of the latter for a short distance. Anal segment of ♀ prolonged to form an ovipositor. — Caterpillar with small setiferous warts; a brown dorsal line accompanied each side by a yellow line; sides striped with white. Pupa in a rather strong, somewhat elongate cocoon.

infausta. **A. infausta** *L.* (1 b). Transparent black-brown; collar, a short streak at the base of forewing and the hindwing from cell to abdominal margin red. Distributed from the Rhenish Palatinate to South Spain and Italy, but not found everywhere, in Germany only in a few localities; flies in July in the sunshine about hawthorn and blackthorn. — Caterpillars on these plants and on Amygdalis, doubtless also on other Rosaceae; sometimes in such numbers that they become injurious.

5. Genus: **Procris** *F.*, Foresters.

Antenna of ♂ long-pectinated, in ♀ feebly dentate and below longitudinally flattened or impressed. Tongue always very distinct. Veins all from the cell (of course, the costal and submedian veins excepted), rarely two of the subcostals of forewing stalked together. Anal-segment of ♀ not modified into a long ovipositor. The species are very uniform in coloration. They are all black-brown or smoky, and are more or less densely clothed with metallic green scales, which assume often a blue or coppery tint. The metallic gloss is almost completely absent from a very few species. In consequence of the great uniformity in aspect and the rather considerable variability of the species in size and colour the forms of *Procris* are very difficult to recognize, unless the structure of the genitalia is taken into consideration. The statements in literature about the distribution of the various species are mostly quite unreliable.

They are, like all Zygaenids, clumsy fliers, which sit sluggishly on flowers; the ♀♀, which are frequently much smaller than the ♂♂, fly rarely, while the ♂♂ swarm freely in the sunshine on warm days, having a slow straight flight. A number of species are very common, but are often found only at certain restricted stations. Dry downs are the principal localities, especially on chalky soil, where the insects are found sitting on the blossoms of Compositae, Dipsaceae, Poterium, Lychnis and other plants.

The caterpillar bears in the first stage single bristles placed on tubercles, while the later stages have broad, flat, densely hairy warts. The young caterpillar mines the leaves of the food-plant, the later stages living free, at least of most species. Pupa in a loose cocoon, fastened on the food-plant or lying on or underneath the surface of the ground.

According to the form of the antennae the species can be arranged into three groups, which, however, are not sharply separated.

The species with distinctly obtuse antennae (*statices* and allies) are connected by *amaura* and allies with the species which have distinctly pointed antennae (*globulariae*, *chloros*, etc.). The third group contains the species with clubbed antennae; for this last group Hampson has proposed the name *Zygaenoprocris*.

Procris is purely Palaearctic; the genus has its nearest relatives in Australia.

A. Species with pointed antennae.

ampelophaga. **P. ampelophaga** *Bayle* (= vitis *Freyer*) (1 c) is a species with long antenna; in contrast to the other species of *Procris* the 3. and 4. subcostals are stalked in nearly all specimens, not the 4. and 5. Shaft of antenna blue; thorax greenish blue; upperside of abdomen green; underside of the body only

feebly glossy. Upperside of wings blackish brown, forewing slightly purple. — Riviera, Italy, S. E. Europe,
Caucasus and Asia Minor. — Larva on Vitis, said to occur sometimes in such quantities as to become in-
jurious; two broods, the first feeding on the young shoots, the second on the leaves.

P. pruni has in the ♂ strongly pectinated antennae, the pectinations lying close together and being
densely scaled: in the ♀ the antenna is distinctly dentate and densely scaled also below at the sides. The
clasper of the ♂ is distally strongly dilated and truncate, the lower apical angle being more or less tooth-
like: the clasper bears near the base a long process. The 7. abdominal sternite of the ♀ is emarginate.
Upperside of head, thorax and forewing mostly slightly green, sometimes glossy green or blue; underside
of abdomen much more glossy than upper. — Larva above more yellow, laterally more grey, bearing red
dots near the warts. On Prunus and Calluna, occurring in spring, rather commonly in some places. From
France to China and Japan, in several slightly differentiated geographical races; not in Great Britain. —
The European specimens, which are the original **pruni** *Schiff. & Den.* (1 c), have the forewing usually slightly *pruni.*
green, rarely blue. — As **amasina** *H. S.* (1 c) specimens have been described from Amasia and recorded *amasina.*
from other places of Asia Minor. This is a small form with a slightly coppery brown forewing which is
green at the base. — **tristis** *Brem.* (1 c), from Amurland and Korea, is a dark form which has little green *tristis.*
on the forewing. — **esmeralda** *Btlr.* (1 d), from Japan, is on the whole more green than the preceding. — *esmeralda.*
chinensis *Feld.* (1 c), of which the author described both sexes, is represented in the Felder collection by *chinensis.*
two very much worn ♀♀. This form has the forewing strongly glossy green-blue. Ning-po; in the British
Museum fresh specimens from North China.

P. elegans *Pouj.* (1 d). Antenna green-blue, feebly glossy, in the ♂ with moderately long pectina- *elegans.*
tions, those of the distal segments being short, in ♀ the pectinations short, the distal segments being dentate.
Body without gloss. Wings smoky, transparent, without metallic gloss; cell of forewing truncate, M^1 close
to the angle. Clasper of ♂ broad, bearing a large black tooth at the base. — West China; Amur (a pair
received from Messrs. Staudinger & Bang-Haas).

P. chloros is distributed from Austria to Asia Minor. Head, thorax and underside of abdomen
strongly glossy. Upperside of forewing densely scaled green or yellowish green or bluish, rarely brownish
with green base, the base being usually much more strongly glossy than the remainder of the wing.
Teeth of the two penultimate antennal segments of ♂ short and fused. Clasper of ♂ apically broadly
rounded, the edge being distinctly incrassate at the lower angle; at the base a dagger-shaped, setiferous,
straight process which is directed backwards. — The first-described form, **chloros** *Hübn.* (1 d), inhabits S. E. *chloros.*
Europe. The specimens with somewhat yellowish forewing and bright green base are ab. **sepium** *Boisd.* *sepium.*
(1 d); they occur in the Southern and Eastern districts of the area inhabited together with the individuals
which have almost uniformly green forewings. — **chloronota** *Stgr.* (1 d), from the Taurus, has a brownish *chloronota.*
forewing with green base: this form, which I know only from the description, resembles apparently very
closely *P. pruni amasina.* Does it belong here?

P. tenuicornis *Zell.* (1 d) is very similar to the preceding species, but the upperside of the forewing *tenuicornis.*
is no more glossy metallic than the remainder of the wing. The structure of the clasper is not known to
me. — Hungary; Italy; S. E. Europe.

P. cirtana is one of the smallest species. The pectinations of the antenna of ♂ are long and
apically broad and are mostly lying as close together as in *pruni.* Body and forewing either brown with little
metallic gloss, or glossy green or blue. Clasper of ♂ ventrally almost evenly emarginate from base to
apex, no basal process, apex feebly bisinuate, the upper angle somewhat projecting. The species occurs in
N. W. Africa and again in Central Asia, and is perhaps also represented in South Europe. — The North
African form, **cirtana** *Luc.* (1 d), has very strong antennae. The specimens with glossy blue forewing are *cirtana.*
ab. **bakeri** *Kirby* (= orana *Baker*) (1 e): they occur together with brown and green individuals. Morocco; *bakeri.*
Algiers. — The Asiatic subspecies, recorded from Samarkand and Margelan, is **ambigua** *Stgr.* (1 e); it differs *ambigua.*
from the preceding only in the slenderer antenna, the pectinations being less broad and standing more
widely apart.

P. incerta *Stgr.* (1 e) is dark green on upperside of body and forewing and has very little gloss. *incerta.*
Hindwing feebly transparent, with an indistinct greenish tint. Clasper of ♂ obliquely truncate at apex,
especially distinguished by a tooth which is placed below the lower angle, projecting inwards and being
curved a little basad. — Fergana; Kuldja.

P. solana *Stgr.* (1 e) is very similar to the previous in colour, but the forewing is on the whole *solana.*
more glossy and the clasper of ♂ bears no tooth. Besides, the 7. abdominal sternite of the ♂ is a little pro-
duced and mesially incised; in the ♀ the segment in front of the vaginal cavity is emarginate. — Fergana:
Osh; Tura; Kuldja; Baldshuan.

P. globulariae. I consider Hübner's *globulariae* to be the large species with pointed antenna which is not rare in Central and South Germany, being distinguished in the ♂ by the moderately long antennal pectinations and the simple clasper. The latter is without a basal tooth: the apex is obliquely truncate and slightly emarginate, the upper angle more projecting than the lower, both being somewhat incrassate. The species varies rather considerably in size and colour. — Larva in all stages mining, not only when young, in the leaves of Scabiosa and Globularia. The cocoon is fastened at plants close to the ground. Europe, with the exception of England and the Northern countries, eastwards distributed as far as Central *notata.* Asia. — The South-Western subspecies is **notata** *Zell.* (= soror *Ramb.*) (1 f), which occurs in Morocco, Spain, South France and Italy. Forewing usually very pale bluish green. — The Central European form is the *globulariae.* true **globulariae** *Hübn.* (? = tenera *Stgr.*) (1 e f). On the whole more densely scaled green or blue-green *subsolana.* than the previous. — **subsolana** *Stgr.* (= cuprea *Ramb.*) (1 f) has a less transparent hindwing; occurring in *suspecta.* Hungary and further South and East. — In Central Asia *globulariae* is represented by **suspecta** *Stgr.* (1 f), *splendens.* of which large specimens with deep-coloured hindwing have been described as **splendens** *Stgr.* (1 g). — All these forms are only slightly different and are connected by intergradations.

cognata. **P. cognata** *H. S.* (1 f), or what I regard to be this insect, has somewhat longer antennal pectinations in the ♂, but is otherwise hardly distinguishable externally from *globulariae.* The clasper of the ♂ is narrower than in *globulariae* and bears at the base a long, free, thorn-like process which is directed backwards as in *P. amphelophaga* and *chloros.* In order to perceive this process it is generally sufficient to remove the scales from the underside of the tip of the abdomen with the help of some moist blotting paper. *turatii.* Strongly glossy Italian specimens which are more densely scaled on both wings are ab. **turatii** *Bart.* (1 g). — Larva mining like that of *globulariae,* in the leaves of Centaurea, in England especially *C. nigra.* Pupa in a loose cocoon in the ground close beneath the surface. — Spain, Italy, France and South-Coast of England; perhaps also in Germany and Austria?

P. budensis. Very similar to the two preceding species in colour. Wings more sparsely scaled and therefore more transparent. The clasper of the ♂ bears at the ventral edge in the centre a broad truncate tooth which stands crossways to the edge; the sternite of the 7. segment is a little produced, the lobe being impressed and mesially slightly emarginate. Hungary and Central Asia, frequently confounded *budensis.* with the following insect. — The Hungarian specimens, **budensis** *Speyer* (1 g), are reather more densely scaled than the Asiatic form and therefore more green on the forewing and deeper fuscous on the hindwing. *asiatica.* — The Asiatic form is **asiatica** *Stgr.* (1 g): resembling the following species, with which it occurs together, but is not quite so transparent. Fergana; Sajan; Sarafshan.

volgensis. **P. volgensis** *Möschl.* (= mollis *Gr.-Gr.*; ? = tenera *Stgr.*) (1 h) is paler still than *budensis.* The 7. abdominal segment of ♂ ventrally not impressed; the clasper with strong pointed tooth near the apex. Probably *paupera Christ.* belongs also here. — South Russia, Fergana, Amdo, and Kuku-nor.

hamifera. **P. hamifera** *spec. nov.* (1 h) is similar to large dark specimens of *P. budensis.* Antenna hardly reaching to three-fourths of cell of forewing, blue. Forewing greenish blue, slightly transparent. Hindwing shorter at hindmargin than in *P. budensis,* distal margin emarginate before anal angle. Clasper of ♂ in the centre of ventral edge with a pointed tooth which is curved basad. — Mts. of Fergana, 4 ♂♂ in the Tring Museum.

hector. **P. hector** *spec. nov.* (1 h). Antenna reaching to four-fifths of cell of forewing, deep blue; upper and under surface of head and thorax somewhat lighter blue; abdomen green. Wings as in *P. budensis,* longer, less transparent; forewing blue above, the posterior half of the hindwing being distinctly washed with blue. Underside of hindwing dusted with blue scales, more densely at costal margin. Clasper with a thin, thorn-like, rather long tooth at the ventral margin close to the apex. — Mersina, 1 ♂ in the Tring Museum.

B. In the following species the ♂♂-antennae have at least 3 segments besides the last without free pectinations.

subtristis. **P. subtristis** *Stgr.* (1 h) has opaque dark green forewings. The hindwing is black, non-transparent. 3 segments of the ♂-antenna shortly dentate. Clasper of ♂ beyond middle with a broad, pointed tooth which only slightly inclines backwards, and deeply sinuate between this tooth and the narrow apex. In *amaura.* true *subtristis Stgr.* the forewing is on the upperside almost black towards distal margin; while ab. **amaura** *Stgr.* (1 h) has the forewing uniformly green. — Kuldja, Fergana, and Sarafshan.

dolosa. **P. dolosa** *Stgr.* (1 i) is a small species which is almost identical with the previous species in colour and in the structure of the antenna; but the hindwing is somewhat paler and the underside of both wings bears rather more blue or green. The clasper of the ♂, however, is widely different, bearing far beyond middle a very long, thin, thorn-like tooth. Specimens with the underside of the wings extended green are *subdolosa.* ab. **subdolosa** *Stgr.* — Sarafshan, Karatagin, Fergana, and Tianshan.

graeca.

P. graeca *spec. nov.* (1 i) has likewise 3 antennal segments with fused teeth. The upperside of forewing much more golden green than in the 2 preceding species, and the hindwing semitransparent in centre. The 7. ventral segment of ♂ (the ♀ is not known to me) produced and somewhat incised at the apex. Clasper with a triangular tooth near the base and another before the broad, obliquely truncate apex. — Greece, one of the two specimens before me collected by MARTIN HOLTZ on the Taygetos in June 1901.

orana.

P. orana *Aust.* (1 i). According to the description a small species which we have from Morocco; the teeth of the 3 last but one segments of the ♂-antenna confluent. Head, thorax, and base of forewing golden green, distal portion of wing somewhat bluish or at lest less golden, fringes sometimes distinctly chequered. Hindwing feebly transparent. Clasper of ♂ obliquely sinuate at the apex, the upper angle projecting. — Morocco; Algiers.

statices.
uralensis.

P. statices *L.* (= staticus *Fourc.;* aureosa *Retz.*) (1 i). Forewing green or bluish, usually feebly transparent in consequence of the thin scaling of the under surface. Hindwing semitransparent. The ♀ usually much smaller than the ♂. In the latter mostly the teeth of 9 antennal segments confluent. Clasper of ♂ broad at apex and obliquely truncate, the lower angle usually somewhat projecting, forming a small lobe. — Larva feeding on Rumex acetosa; paler above than at sides, with a reddish dorsal stripe, naked around the upper setiferous warts. Pupa in a loose cocoon on the ground at the bases of plants. The name **uralensis** *Gr.-Grsh.* (1 k) refers to pale bluish specimens; there is in the Tring-Museum a specimen from the Ural from the collection of GRUM-GRSHIMAILO. — In Russia distributed northward about as far as the 64°; in Great Britain extending north into Scotland. The southward distribution of *statices* is not known with certainty; the species has been recorded from all the Mediterranean countries of Europe and also from Asia Minor, but all these records require confirmation. The commonest species in Central Europe.

micans.
heydenreichi.

P. micans *Freyer* (= manni *Led.*) (1 k). Similar in size to the preceding species. Forewing much more densely scaled blue or green, and the hindwing much blacker and below more green or blue. Clasper with a rather strong tooth near the broad apex. Specimens with very thick antennae are ab. **heydenreichi** *Led.* (= crassicornis *Stgr.*) (1 k). — Bavarian Alps (FREYER, not found again?), South Hungary, Balcan Peninsula, Italy, South France, Spain.

geryon.
chrysocephala.

P. geryon *Hübn.* (= minor *Eversm.*) (1 k). Smaller than *statices,* the sexes nearly equal in size, the clasper of ♂ usually with a triangular tooth before apex. — Larva on Helianthemum vulgare; less bright in colour and smaller than the larva of *statices*; with a brown dorsal stripe which is divided by a thin white line; a few granules around the upper setiferous warts. Pupa in a dirty white cocoon, which is attached to plants, especially moss, close to the ground. In small specimens usually only 7 antennal segments of the ♂ have the teeth merged together, besides the end-segment; this is ab. **chrysocephala** *Nick.* (1 l), which is especially plentiful at high altitudes in the Alps. The British specimens of *geryon* cannot be distinguished with certainty from *chrysocephala.* — Common on chalky soil. Europe, extending northward as far as England and Scandinavia, southward to Asia Minor and Spain.

obscura.
anceps.
balcanica.

P. obscura *Zell.* (1 l). Forewing narrower than in *geryon*; hindwing less transparent, especially at the posterior margin, anal angle rather more prominent. — There are apparently two geographical races. The one described by ZELLER occurs in Asia Minor and on Rhodos; glossy yellowish green specimens are ab. **anceps** *Stgr.* (1 l). — In Turkey occurs the form **balcanica** *Stgr.*, which is larger and has dull yellowish green forewings.

C. Species with clavate antennae.

capitalis.

P. capitalis *Stgr.* (1 l) is easily distinguished in both sexes by the clavate antenna and green forewing. — Armenia. STAUDINGER found the insect very plentiful early in June on the Jenikeni Plateau, where it was flying about close to the ground.

duskei.
aerea.

P. duskei *Gr.-Grsh.* Antenna clavate. Forewing black-brown, according to the author, rarely dark green, tongue yellow. The ab. **aerea** *Gr.-Grsh.* is larger and dark bronze-colour. — Persia.

chalcochlora.

P. chalcochlora *Hamps.* (1 l). Head, thorax and forewing golden. Hindwing black-grey. Antenna of ♂ and ♀ clavate, in ♂ strongly pectinate (club excepted), in ♀ dentate. — Chitral.

6. Genus: **Trypanophora** *Koll.*

Antenna of ♂ strongly, of ♀ shortly pectinate, but the teeth of the distal segments rather long also in ♀. In forewing 3., 4. and 5. subcostals stalked, 2. und 3. radials from the cell; in hindwing 1. radial absent; both wings with vitreous spots. — Larva narrowed behind, truncate anteriorly; ground-colour black, green, or red, paler below than above, smooth, with rows of setiferous warts, a tubercle on each side of thorax larger. Polyphagous, feeding on the leaves of Anacardium, Terminalia, Spondias, Mangifera etc. The yellowish brown pupa in a dense, milky white cocoon. — Indo-Malayan Subregion, extending northwards to Kashmir and South China.

semihyalina. **P. semihyalina** *Koll.* (2a). Frons and a spot on the mesothoracical tegula reddish yellow, 4. and 5. abdominal segments yellow above. Forewing near the base with a band of vitreous spots and a large vitreous patch beyond middle consisting of many spots. Hindwing with vitreous spot at base and a row of 3 vitreous spots behind the apex of cell; on the underside a yellow spot in front of apex of cell. — Kashmir, India, South China. Variable in the tropical districts.

7. Genus: **Eterusia** *Hope.*

Forewing elongate. Antenna of ♂ long-pectinate, of ♀ dentate, except the last segments, which bear also in ♀ long pectinations, giving the antenna the appearance of being clubbed. 2. and 3. radials of forewing stalked. Sexes often very different in pattern, the ♀♀ in these cases being much paler and more extended light in colour than the ♂♂. These ♀♀ remind one of Fulgoridae on account of the leathery appearance of the wings.

leptalina. **E. leptalina** *Koll.* (2a). Sexes dissimilar. ♂: collar red, tegula of mesothorax yellow, underside of body grey-yellow. Wings greenish black, markings yellow; forewing with longitudinal streak at base, an abbreviated, sometimes interrupted, transverse band in centre, and a dot outside apex of cell; hindwing yellow from base to near apex of cell, the veins more or less black. Underside more extended yellow and paler; hindwing almost entirely pale yellow, bearing some black spots beyond cell. ♀ with the head and *sexpunctata.* collar red; abdomen ringed with fuscous. In the ♀-f. **sexpunctata** *Walk.* (= octopunctata *Möschl.*) (2a) both wings are yellow, the hindwing being occasionally whitish, and bear usually one or several sharply marked black spots. In ♀-f. **leptalina** *Koll.* (= cicada *Fldr.*, triliturata *Walk.*) (2a) the forewing is more or less extended fuscous between the veins. — Central and West China, Kashmir, Afghanistan, North-West and North India.

elizabetha. **E. elizabetha** *Walk.* (= dirupta *Walk.*, microcephala *Fldr.*) (2b). ♂: head and collar green; underside of body pale yellow; markings of wings yellow, paler below; forewing with longitudinal stripe at base, two spots in centre, a larger spot distally of cell and several submarginal spots: central area of hindwing yellow, irregulary divided by the dark veins. ♀ very similar to ♀-f. *sexpunctata* of *E. leptalina*, but head and collar not red. — Yang-tse-kiang, from Shanghai westwards to Ta-tsien-lu, found in June, July and August.

tricolor. **E. tricolor** *Hope* (2b). Sexes similar. Green-black; antenna, head, part of back, some spots at apex of hindwing, as well as the veins in the distal portion of forewing below and the borders of the submarginal spots metallic blue. Abdomen yellow, banded with blackish blue above in ♂, below in ♀. Forewing with yellowish white spots: 1 at base, 2 proximally of centre, 1 distally of apex of cell and an irregular submarginal series. Hindwing with a broad yellow band, which occupies nearly the whole hindmargin. — West China, in June; common in North India.

magnifica. **E. magnifica** *Btlr.* (2b). Sexes similar. Like the preceding, paler, forewing with a band proximally of middle. Abdomen yellow above in ♂ and ♀. — West China; common in North India.*)

aedea. **E. aedea** *L.* (2c). Sexes similar. Markings of both wings white, otherwise like *magnifica*. Perhaps *aedea* and *magnifica* are mere colour-varieties of the same species. — Common in Central and West China, Indian specimens being somewhat different.

8. Genus: **Rhodopsona** *gen. nov.***)

Antenna of ♂ and ♀ long-pectinate, bushy, pectinations remaining also in ♀ rather long at apex. 8. abdominal segment of ♂ and claspers long, these longer above than below, almost closed below. Forewing with red stripe or for the greater part red. ♂ and ♀ similar in pattern. — India, China.

costata. **R. costata** *Walk.* (2c). Black; head and collar red; a broad red costal streak on forewing, curving backwards at apex of cell, extending to hinder angle. — Common in West, Central, and North China, the streak being yellowish red in West Chinese ♀♀.

rubiginosa. **R. rubiginosa** *Leech* (2c). Forewing red, only the tip and a streak behind cell being black. Pectinations of antenna very long; 2. and 3. radials of forewing separate. — West China, in the Tring-Museum some specimens which were obtainad between Chungking and Mt. Omi (= Omei-Shan).

9. Genus: **Pidorus** *Walk.*

Antenna of ♂ and ♀ pectinated. Forewing with white or yellow transverse band; hindwing unicolorous or with yellow spot or band. Claspers of ♂ truncate, widely open. Sexes similar. — Indo-Malayan, northward to Japan and Corea.

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*) The figure is taken from an Indian specimen. Chinese individuals are paler yellow and agree with *aedea* in the extent of black on the wings.

**) Name-type: *costata Walk.*

atratus. *P. glaucopis Drury.* Brownish black, body somewhat blue; occiput red. Forewing with a slightly curved dirty white band. Underside with metallic blue submarginal spots, the hindwing, moreover, being washed with blue towards base. — The Palaearctic form is **atratus** *Btlr.* (2c), differing from the Indian *glaucopis* in the underside being less marked with blue. Very common in Japan, occurring also in Corea, Manchuria, and West China.

gemina. **P. gemina** *Walk.* (2b). Black-brown; occiput red; sides of breast and underside of abdomen yellow in ♂. Forewing with a straight yellow band. — Only one specimen known from West China; more common in South China and North India.

euchromioides. **P. euchromioides** *Walk.* (= fasciata *Fldr.*) (2c). Blue; occiput red. Forewing with pale yellow band; hindwing with large, irregular, yellow patch. — Corea and North China, apparently rare; LEECH met with this insect, which reminds one of *Chalcosia remota,* near Gensan in July.

leechi. **P. leechi** *nom. nov.* (fasciatus *Leech*) (2d). Black, with yellow median band extending across both wings. — Omei-shan and Mupin, West-China, in May and June.

10. Genus: **Herpa** *Walk.*

Antenna pectinate in ♂ and ♀, the teeth being very long in ♂. Crossveins of both wings very deeply angulate, the upper corner of cell much more projecting than the lower corner. Yellow species, without metallic gloss on the wings, collar not red. — India, China.

sinica. *H. venosa Walk.* Yellow; veins of both wings black. In North India and West China. — The Chinese specimens are paler than the Indian ones: **sinica** *Oberth.* (2d), from Ta-tsien-lu, West China.

ochracea. **H. ochracea** *Leech* (2d). Like the preceding species, but the abdomen black. — Wa-shan, West China, in July, one ♂ in coll. LEECH (now belonging to the British Museum).

luteola. **H. luteola** *Leech* (2d). Only one ♀ known to us. Head black; tegula of mesothorax yellow; thorax and abdomen bluish black, the latter yellow beneath. Wings dirty pale yellow, veins and margins black. — Wa-shan, West China, in July.

basiflava. **H. basiflava** *Oberth.* (2d). Body black. Wings dirty grey-yellow, veins black; forewing with yellow basal patch which is bordered by a black band. — More frequent than the previous species; West China, in July.

11. Genus: **Corma** *Walk.*

Pectinations of antenna shorter than in *Herpa Walk.*; 3. subcostal of forewing proximal of 4.; upper angle of cell projecting very far, the hinder angle acute, 2. and 3. radials stalked; upper cell-corner of hindwing truncate, no further projecting than the acute lower angle. — Indo-Malayan and Chinese.

laranda. **C. laranda** *Druce* (2e). Body above brown-black, edge of collar and underside dirty yellow. Wings brown-black, marked with dirty white; forewing with 2 spots proximally of centre, a larger spot proximally of apex of cell, an interrupted discal band and some submarginal dots; hindwing with dirty white streak behind cell. — West, Central and Southern China.

12. Genus: **Chalcosia** *Hbn.*

Like *Herpa;* pectinations of ♂-antenna shorter. Cross-veins of both wings likewise deeply angulate, the upper corner of cell projecting, at least in forewing, but not so much as in *Corma.* All the larger species have a red collar; the dark parts of the body and wings are more or less metallic. — Indo-Malayan, extending northward to Japan and Corea. The insects occur in West China partly at considerable altitudes: such forms extend most probably farther north in Western China than is at present known. Some species are very variable individually, the specific distinctness of many forms being doubtful.

pectinicornis. *auxo.* **C. pectinicornis** *L.* (= thallo *L.*: guerini *Kirby*) (2e). Wings brown, partly green or blue, especially distally on the veins; forewing with two macular bands; hindwing with a short white band at the apex of cell, or also the basal area as far as this band suffused with white. ab. **auxo** *L.* (= tiberina *Cram.*) (2e) is a conspicuously different form in which the hindwing is yellowish white, bearing a sharply defined blue-black marginal band traversed by blue veins. — China.

suffusa. **C. suffusa** *Leech* (2e). Forewing, especially distally on the veins, pale ferruginous red; a white band in centre, accompanied by black spots internally and externally; an interrupted subapical row of white spots.

Hindwing white, with broad black marginal band which is somewhat washed with blue and is ill-defined posteriorly; median veins blackish. Underside white and black, base of forewing blue. — West China, very common, in June and July.

reticularis. **C. reticularis** *Leech* (2 e). Forewing yellowish white, the veins black, black basal streaks between the veins: distal margin and two somewhat ill-defined bands also black. Hindwing with black marginal band which extends to 2. median, the veins being green within this band. — Ta-tsien-lu, West China; a ♀ in coll. Leech.

remota. **C. remota** *Walk.* (2 f). Greenish black; body, antenna, and veins of upperside of forewing metallic blue, underside also with blue shimmer here and there on the black portions of the wing. Forewing with an almost straight white band. Hindwing white from base to apex of cell, this area interrupted by an ill-defined, centrally usually incomplete, black band which emanates from the centre of the costal margin, broadly joining the marginal band before anal angle: this median band sometimes much widened. — A rather common species, which is found from West China to Corea and Yezo.

syfanica. **C. syfanica** *Oberth.* (2 f). A small greenish black species. Veins of forewing whitish; a straight white band not far from base, a second one, somewhat undulate, from the centre of the costal margin. Hindwing white, with a posteriarly narrowing black marginal band. Collar whitish yellow; abdomen ringed with white above, all white below. — Ta-tsien-lu, West China.

thibetana. **C. thibetana** *Oberth.* (2 f). Similar to the preceding, smaller, forewing with only one white band, which is forked anteriorly. — Ta-tsien-lu, West China, Gan-ssu.

alpherakyi. **C. alpherakyi** *Leech* (2 f). Like *thibetana*, but as large as *syfanica*; forewing metallic green, the veins not whitish, the white band broader, not Y-shaped. — In West China near the Tibetan frontier; 6 ♂♂ and 3 ♀♀ were found at an altitude of 3000 m; June and July.

The last three small forms are perhaps only varieties of one species.

13. Genus: **Erasmia** *Hope.*

Frons strongly projecting. Antenna pectinated in ♂ and ♀. Cross-vein in both wings feebly angulate; hind angle of cell of hindwing projecting farther distad than the obtuse upper angle; 2. and 3. radials of forewing on an long stalk, strongly curved. — Larva (of *pulchella*) velvety black; tubercles pale red; a rectangular dorsal yellow patch extending over two segments. — Large insects, with black wings which are marked with white and metallic green-blue. The forewing bears a dirty dark yellow band in basal half; a costal spot of the same colour in the proximal third of the hindwing. — North India to South Japan.

E. pulchella Hope. Hindwing with a broad white band which narrows anteriorly, occupying posteriorly almost the whole margin. The species was described from Indian specimens. — China is
chinensis. inhabited by a special subspecies which we designate **chinensis** *subsp. nov.* (2 g). The black of both wings is more extended, the white and blue-green markings therefore being reduced. Common in West China, in June and July.

sangaica. **E. sangaica** *Moore* (2 g). Similar to the preceding species, but the hindwing for the greater part black, the broad white band of *pulchella* being represented only by some green-edged spots. — Shanghai, Kagoshima, Kiushiu; in June.

14. Genus: **Campylotes** *Westw.*

Frons only slightly prominent. The veins branching off from the cell in both wings nearly all strongly curved, being partly undulate; 2. to 5. subcostal of forewing stalked together, also the 2. and 3. radials and 1. median; in hindwing 2. and 3. radials long-stalked; cross-vein feebly curved, in both wings the lower angle of cell more projecting than the obtuse upper angle. — North India and China. Some species occurring at very higt altitude, 3000 m. Wings with red and yellow longitudinal stripes and white or yellow subapical spots.

histrionicus. **C. histrionicus** *Westw.* (2 g). Shoulder pale yellow. Comma-spots of hindwing not interrupted. — Afghanistan, North-India, and West-China.

romanovi. **C. romanovi** *Leech* (2 h). Shoulder with red spot; body otherwise greenish black. Streaks of forewing and comma-spots of hindwing not interrupted by a black band. — A frequent species in West China, near Mupin and Washan, in June.

desgodinsi. **C. desgodinsi** *Oberth.* (2 h). Femora and underside of abdomen pale yellow. Shoulder without spot. The streaks and comma-spots interrupted by a black line which runs from the middle of costa of forewing obliquely blackwards, being on hindwing almost parallel to distal margin; frequently a similar line also near base of forewing. — Very common in West China.

pratti. **C. pratti** *Leech* (2 h). Similar to *desgodinsi*; paler, a black, curved, subbasal band on forewing, the black median band more evenly curved. — Central and West China, rather common near Chang-Yang on the middle Yang-tse-kiang.

minima. **C. minima** *Oberth.* (2 f). The smallest known species; perhaps a dwarf-form of *histrionicus Westw.* A yellow shoulder-spot on mesothorax as in *histrionicus*; femora grey-yellow; abdomen below reddish yellow. Markings of forewing yellow, the costal and hindmarginal streaks being broad. — West China, Omei-shan and Ta-tsien-lu, in June and July.

15. Genus: **Histia** *Hbn.*

Both wings strongly elongate. Forewing with numerous vein-lets between costa and edge; 1. subcostal anastomosing with costa, cross-vein deeply angulate, the upper angle of cell strongly projecting; in hindwing the cross-vein not angulate, short, all veins from cell. — Larve brown, with pale red warts, reminding one of the larvae of Aristolochia-Papilios. Piepers found the larva of *libelluloides* in Java on Bischofia javanica. The cocoon was fastened on a rolled-in leaf.

The imago resembles the tailed black Aristolochia-Papilios.

H. rhodope Cram. Head, breast, the larger proportion of the abdomen and a basal spot on the underside of the wings red. Hindwing blue-green from base to about apex of cell. North India to the Loo-Choo Islands. — The Chinese form is small, the blue of the hinwing being strongly reduced, especially in ♀: **nigrinus** *subsp. nov.* (3 a). West and Central China, rather rare. *nigrinus.*

16. Genus: **Agalope** *Walk.*

Frons slightly prominent. Antenna much shorter pectinate in ♀ than in ♂. Body and wings without metallic gloss. Wings parchment-like, semitransparent, clothed with small hair-scales. Cross-vein sharply angulate in both wings; 1. subcostal of forewing free. — Afghanistan and China to New Guinea. — The Indian species *bifasciata* is described a good flier, occurring in company of *Delias* and flying rather high above the ground. All species yellow or yellowish at or near the base of forewing.

A. eronioides Moore. Danaid-like. Forewing with white basal dot; both wings distally more or less black; forewing with whitish spots. — The northern form, **diluta** *subsp. nov.* (3 b), from West China, is *diluta.* much paler than the Indian one, the distal margin being much less densely scaled black and the white spots of the forewing being larger and less sharply marked. Omei-shan and Mupin, in June.

bieti. **A. bieti** *Oberth.* (3 b). Similar to *diluta;* wings, especially the forewing more extended fuscous, but not so black as the distal margin of Indian *eronioides;* the yellow basal spot of forewing small, not sharply defined; hindwing without the fuscous band which in *diluta* touches the tip of cell. — Ta-tsien-lu.

dejeani. **A. dejeani** *Oberth.* (3 a). Forewing very faintly yellowish at the base; two blackish bands between base and middle; distal margin of both wings feebly washed with blackish. — Ta-tsien-lu, at high altitudes.

davidi. **A. davidi** *Oberth.* (3 a). Similar to the previous, basal spot distinct, the two bands absent; upper angle of cell of hindwing less projecting than lower. — Common in Central and West China, in June.

immaculata. **A. immaculata** *Leech* (3 b). Similar to *davidi;* branches of antenna longer; wings much less blackish, hindwing almost pure yellowish white. — Ta-tsien-lu, West China, in July.

hyalina. **A. hyalina** *Koll.* (3 b). Forewing with basal spot; a band distally of centre of cell; a white spot in front of 5. subcostal and a larger one before 1. median. Hindwing white. — Afghanistan to Burma.

17. Genus: **Elcysma** *Btlr.*

Similar to *Agalope*, hindwing tailed, 2. and 3. radials stalked. — Larva thick, dirty pale yellow, with five violet-brown longitudinal stripes; between the stripes short black bristles. Cocoon dirty white, fastened to the midrib of a leaf. — Southern Amurland, Corea, Japan, Birma. Only one species known.

E. westwoodi. Yellowish white, semitransparent. Antenna black. Veins and distal portion of wings more or less blackish. Base of forewing yellow, this patch distally bordered by a black line. Two forms in the Palaearctic Region, a third in Birma. — The species was first described from Japan; in this *westwoodi.* form, **westwoodi** *Voll.* (3a), the wings are distally rather strongly blackish and the tail is long. The costa of hindwing bears in distal half one or several short veinlets branching off on anterior side. — *caudata.* **caudata** *Brem.* (3a) is the form from Askold and the Ussuri-district. Wings less blackish; forewing more rounded; tail shorter; costa of hindwing without veinlets.

Subfamily: **Zygaeninae.**

Foretibia always with spur, which usually extends beyond the tip of the tibia. Tongue present (obsolete in *Artona maerens* according to Staudinger). The species are universally small, only a few surpassing in size a little our *Z. filipendulae.* The hindwing very often small, and many species have lost the upper radial (vein 6). The species with small hindwing, and especially the forms with vitreous spots, bear a bewildering likeness to the Syntomids, but are easily recognized, as nearly all Zygaenids, by the distinctly developed 1. submedian vein (1c of Herrich-Schaeffer), the frons being moreover mostly strongly convex. — The larvae, as far as known, live free on leaves, pupating in a tough, opaque cocoon which is fastened on a rolled-in leaf or at a stalk. Whereas the species of the genus *Zygaena* and the very closely allied exotic genera occur mostly gregariously, the other forms are nearly always met with in single specimens. The oviposition of the ♀♀ of these insects appears therefore to be different. However, the smaller forms, which are not conspicuous either by size or garb, escape easily the observation of collectors in the tropics whose eye is averted by the butterflies, and we receive therefore little information about the habits of these pretty but small and inconspicuous insects. Sometimes, however, the larvae occur in such numbers that they destroy the foliage of whole trees.

18. Genus: **Artona** *Walk.*

Here belong all the species with 2 pairs of spurs to the hindwing, long palpi and long legs, the 1. radial of hindwing (vein 6 of Herrich-Schaeffer) being absent. Small differences in the shape of the wings, in neuration and in the structure of the antennae, which have served for the characterisation of a number of genera, are effaced by transitions.

The narrow-winged species have quite the aspect of Syntomids, some remindinding one also of Aegeriids (usually called Sesiids in Europe), while the broad-winged forms are *Lithosia*-like. Graeser found *octomaculata* resting on a flower.

gracilis. **A. gracilis** *Walk.* (3c). Body metallic. Antenna of ♂ pectinated, of ♀ simply filiform, being ventrally impressed longitudinally. Wings narrow; forewing with several narrow, yellow streaks; hindwing vitreous except margins. — Japan and Corea, in July.

A. octomaculata. Like the previous. Antenna white before apex. 4 yellow spots on forewing. Two *octomaculata.* geographical forms. — **octomaculata** *Brem.* (3e) occurs in Amurland; the two external spots are large and not divided. — *aegerioides.* **aegerioides** *Walk.* (= sesiaeformis *Fldr.*) (3c) has smaller and less sharply defined spots, the posterior discal spot moreover being divided by a fuscous vein. Japan, Corea, North and Central China.

superba. **A. superba** *Alph.* (3c). Body ringed with yellow. Forewing with pale yellow spots: a long streak in front of cell, a spot behind cell, and distally a row of 4 spots. Hindwing deeper yellow, margined with black, 1. submedian black. — Se-chuen, in August.

clathrata. **A. clathrata** *Pouj.* (3d). Body and wings yellow, the latter bordered with brown. Veins of forewing and two oblique transverse lines as well as an irregular transverse line on hindwing brown. Abdomen above ringed with brown. — At Mupin in West China.

funeralis. **A. funeralis** *Bllr.* (= chinensis *Leech*) (3d). Brown-black, antenna and body slightly metallic, upperside of forewing with an indistinct purplish sheen in side-view. Forewing opaque, without markings; hindwing pointed, more or less transparent centrally from base to beyond apex of cell and from the cell-fold to the hindmargin. — Nagasaki, in June; Yokohama; Gensan in Corea, in Juy; Chang-Yang on the Yang-tse-kiang, in June.

maerens. **A. maerens** *Stgr.* (3d) belongs here most likely, though the tongne is absent (according to Staudinger). Dull black, hindwing below somewhat grey. — Raddefka and Wladiwostock, in June; north of Peking, in July.

manza. **A. manza** *Alph.* (3c). Abdomen yellow. Wings spotted with yellow. Forewing with 3 dots proximally of middle and two externally diverging spots beyond middle. Hindwing with large yellow spot from hindmargin to cell and a small spot in the black marginal band. — Gan-ssu.

cyclops. **A. cyclops** *Stgr.* (3d). Blackish olive-brown, frons, palpi, a portion of underside of body, fringes of wings, a spot at tip of cell of forewing and a large, longitudinally divided patch on the hindwing below pale yellow; 2. and 3. radials of hindwing stalked. — Amurland, Corea, Central China. Very close to the Indian *quadrimaculata Moore.*

sieversi.
A. sieversi *Alph.* (= dejeani *Oberth.*) (3 d). Forewing with a yellow streak behind cell from base almost to middle and a yellow spot on cross-veins; fringes yellow. Hindwing yellow, bordered with black, 2. and 3. radials from cell or stalked. — West China; Kuku-nor.

cuneonotata.
A. cuneonotata *Leech* (3 d). Frons white; forewing with a yellow line in front of cell, besides the two spots of *sieversi*; black border of hindwing broader. — West China, in July.

delavayi.
A. delavayi *Oberth.* (3 d). Basal streak and discal spot of forewing united. — Rather frequent in West China, in June; Yunnan.

aurulenta.
A. aurulenta *Pouj.* (3 c). Forewing with 3 whitish yellow spots, the 1. and 2. close together, the 3. large, kidney-shaped, distally of the cell. Hindwing yellow, bordered with black, a small black spot at costal margin. — Mupin.

sinica.
A. sinica *Alph.* (3 c). Forewing with 3 whitish yellow dots in first third, and a double spot distally of apex of cell. Hindwing yellow, with black border, which is broadest behind middle. — Sechuen. The only know specimen is said to be a ♀, but is doubtless a ♂ according to the antenna; however, Alphéraky might easily have ascertained the sex by the frenulum.

albofascia.
A. albofascia *Leech* (3 g). Body metallic. Forewing blackish, somewhat metallic at base; a straight, externally somewhat irregular, white band proximally of middle. Hindwing white, with back distal border. — Ta-tsien-lu on the Upper Yang-tse-kiang, in July.

19. Genus: **Illiberis** *Walk.*

Tongue long. Palpus very short. Antenna in ♂ long-pectinale, the distal segments being usually dentate, in ♀ shortly pectinate or dentate. Hindtibia with 1 pair of short spurs. Veins from the cell, rarely 2. and 3. radials of forewing stalked; 1. radial of hindwing (vein 6 of Herrich-Schaeffer system) present. — *Procris*-like insects, easily distinguished from *Procris* by the foretibial spur. As in that difficult genus we are also in *Illiberis* not well acquainted with the distribution of the species.

sinensis.
I. sinensis *Walk.* (3 e). Antenna pectinate to tip in ♂ and ♀, branches of ♀ short but distinct; shaft of antenna glossy green-blue; body black, with a feeble dark green gloss. Wings transparent; fringes black; basal half of costal edge of forewing, the whole hindmargin, and on the hindwing the costal margin more densely scaled black. 1. median of both wings proximally of cell-angle; cross-vein of hindwing sharply angulate, the lower cell-angle projecting. Clasper of ♂ divided almost to the base into 2 long narrow processes of which the ventral one is pointed, being very strongly chitinized. — Central and West China.

assimilis.
I. assimilis *spec. nov.* (3 e). Entirely like the preceding except for the ventral process of the clasper of ♂ being replaced by a quite short, very broad lobe which bears a conical tooth. — Gensan in Corea, Central China, in June and July.

rotundata.
I. rotundata *spec. nov.* (3 e). Antenna of ♀ dentate. Forewing shorter and more rounded than in the previous insects, hind and distal margins of forewing more densely scaled, many scales of the upperside 3-toothed, fan-like; median veins of both wings nearer the cell-angle than in the previous species, cross-vein of hindwing feebly angulate, the lower angle of cell little projecting, 2. and 3. radials and 1. median of hindwing about equidistant from each other. — Chang-Yang on the Yang-tse-kiang, in June.

psychina.
I. psychina *Oberth.* (3 e). Antenna of ♂ rather shortly pectinate, the last 5 or 6 segments dentate, antenna of ♀ dentate. Abdomen above feebly green, below dark grey, especially in ♂. Wings blackish grey, the scales pale. the fringes deeper black. 1. median of both wings close to angle of cell; lower cell-angle of hindwing projecting. Clasper of ♂ broad, bearing at the ventral edge a large, triangular, acuminate tooth. — Wladiwostock; Askold, from end of April; doubtless often confounded with the following species.

hyalina.
I. hyalina *Stgr.* (= consimilis *Leech*) (3 f). Antenna of ♂ pectinate, the last 10 segments dentate, these simple in ♀, the others dentate. Body and wings grey, somewhat yellowish, pale purple in side-view, especially on the veins. Underside and on hindwing also the upperside at costal margin scaled white; scales long, feebly bidentate, those of underside of both wings as well as those of upperside of hindwing mostly non-dentate. Cell of forewing in proximal half more angustate than in the preceding species, the subcostal and median veins contiguous; 1. median of hindwing far from cell-angle, 4. and 5. subcostals of forewing from a point or short-stalked. Clasper of ♂ broad, with simple, evenly curved

ventral edge. — Wladiwostock, found by Graeser from 26. May to 3. June in the vally of the so-called first river; also in Se-chuen.

tenuis. **I. tenuis** *Btlr.* (3 f). Antenna of ♀ shortly pectinate, the last 14 or more segments of ♂ and ♀ dentate. Body rather strongly glossy. Anterior border of hindwing inclusive of cell (apart from a small spot) black, a distinct black bar on the cross-veins of forewing; cell of forewing truncate, the lower angle almost acute, 1. median from this angle, this vein in hindwing distant from apex of cell. Clasper of ♂ broad, with a broad, spiniferous, basal process. — Japan, Amurland, Corea, May to August.

nigra. **I. nigra** *Leech* (3 g). *Procris*-like. Body green-blue, feebly glossy, in ♀ quite dull. Antenna of ♂ long-pectinate, 3 or 4 penultimate segments long-dentate; the branches short in ♀. Wings not hyaline, clothed with large scales of which the apex is rounded; forewing only very faintly transparent, with distinct, pale blue sheen, distal margin feebly rounded, 1. median from the obtuse angle of cell, midway between the 3. radial and 2. median; in hindwing 1. median rather distant from cell-angle, also midway between 3. radial and 2. median. Clasper broad, with simple ventral margin, there being a spiniferous hump on inner side at base. — Japan.

ochracea. **I. ochracea** *Leech* (3 e). Body and antenna without metallic gloss. Abdomen grey-yellow, clay-colour, if denuded. Antenna of ♂ with very long branches which stand far apart, of ♀ more shortly pectinate. Wings blackish grey, with very feeble yellowish tint. 1. median of forewing a little proximally of cell-angle. Ventral sclerite of 7. abdominal segment excised; 8. sternite of ♂ bilobate. — Central and West China.

transvena. **I. transvena** *spec. nov.* (3 d). Smoky black; wings partly transparent between the veins, black on the veins and at the edges, the forewing bearing a short subapical band of the same colour; a streak from base to 2. median and on hinwing a subcostal stripe from base to apex yellowish white. — Shanghai; one specimen in the British Museum.

20. Genus: **Phacusa** *Walk.*

Like *Illiberis*, but 1. radial of hindwing absent. — Indo-Australian and Chinese, northward extending to Corea.

cybele. **Ph. cybele** *Leech* (3 e) ♂. Antenna very strongly glossy, shortly pectinate, the distal segments dentate. Forewing in shape like that of *Illiberis sinensis*, distal margin somewhat longer; apex of cell rounded, 4. and 5. subcostals from a point, 2. and 3. radials stalked (individual character? the 2. radial absent from the right wing), both medians distant from cell-angle, the 2. nearer the base than in *I. sinensis*. Distal margin of hindwing not emarginate, 1. radial absent, cross-vein feebly curved, 2. and 3. radials long-stalked in the right wing, from a point in the left, but in this wing the 3. radial distally not developed. Clasper broad. — Gensan, in June, one ♂ collected by Leech.

translucida. **Ph. translucida** *Pouj.* (3 f). Similar to *Illiberis tenuis*, larger, veins and wing-margins broader black, the black stripe along hindmargin of forewing dilated distally of middle, 4. and 5. subcostals stalked. — West China, in June.

dirce. **Ph. dirce** *Leech* (3 f). Apex of forewing broadly black, like the black hindmargin with a purple-blue sheen in side-view. — North China, Corea.

nigrigemma. **Ph. nigrigemma** *Walk.* (= cyanecula *H. Sch.*) (3 g). Antenna of ♂ and ♀ long-pectinate, very strongly glossy. ♀ with yellow anal woolly tuft; clasper of ♂ with a long hook the tip of which is curved down- and forwards. — North China.

21. Genus: **Inope** *Stgr.*

Similar to *Illiberis*, but hindtibia with 2 pairs of spurs according to statements of Staudinger and Graeser. — Amurland. The species are not known to me from specimens.

heterogyna. **I. heterogyna** *Stgr.* (3 g). Smoky black; wings feebly transparent; no metallic scales; 4. and 5. subcostals of forewing stalked. Larva light red, covered with many black dots; head shining brown. On Pyrus, in May. Pupa brown, in a white silky cocoon. The imago flies in Juni. — Wladiwostock, Ussuri, Askold.

impellucida. **I. impellucida** *Graes.* (= pellucida *Kirby*) (3 g). Wings dark brown-grey, opaque, more elongate than in *heterogyna*. — Wladiwostock, in July.

I. ulmivora *Graes.* (3 h). Antenna of ♂ long pectinated, of ♀ shortly pectinated. Wings grey-black, transparent, without markings; veins, margins and fringes black; 4. and 5. subcostals of forewing not stalked. — Larva velvety black, with 2 broad, bright yellow, dorsal, transverse bands; head glossy black; on Ulmus campestris, in autumn. Pupa hibernating, brown-yellow; cocoon hard, white, fastened on a rolled-in leaf. Imago in May. *ulmivora.*

22. Genus: **Clelea** *Walk.*

Palpus short, scarcely reaching beyond edge of frons. Hindtibia with two or one pair of spurs, there being species in which the median pair is sometimes absent, sometimes present. — Indo-Malayan; China. The *Inope*-species belong perhaps to this genus.

C. cyanicornis *Pouj.* (3 h). Body with strong metallic gloss. Antennae white before apex. Forewing black, with 5 white dots: 3 in a submedian row, 2 beyond apex of cell diverging distally. Hindwing all black or with white dot. — Central and West-China, in June. *cyanicornis.*

C. albomacula *Leech* (3 h). Like *cyanicornis*, but hindwing white with broad black margin. — West China, only 1 specimen known. *albomacula.*

C. sapphirina *Walk.* (= stipata *Alph.*) (3 h). Black, body green or blue. On forewing blue spots, namely a streak at base, a transverse band before middle, an interrupted ellipse before apex with a spot behind it, and a thin marginal line. — South, Central and West China; North India. *sapphirina.*

C. fusca *Leech* (3 h). Antenna and head purple blue, pronotum golden. Forewing yellowish brown, very slightly metallic. — Japan; I-chang on the Yang-tse-kiang (the same?). *fusca.*

C. syfanicum *Oberth.* (3 h). Large. Forewing with broad red costal streak which curves backwards distally. Hindwing red, distal and posterior margins black. Reminding one of *Retina costata.* — Tong-ho and Moupin, in West China, April and May. *syfanicum.*

C. melaleuca *spec. nov.* (3 i). ♀; head, thorax and antenna brown-black; abdomen and wings white. Forewing with some black dots in proximal third; a little more than distal half brown-black, with grey veins and, at apex of cell, a white spot; 1. subcostal proximal to two-thirds of cell. Hindwing white, with black marginal band which tapers behind, not reaching anal angle. — Ta-tsien-lu. *melaleuca.*

23. Genus: **Piarosoma** *Hamps.*

Similar to *Phacusa.* The two median veins very close together in both wings, 1. radial of hindwing present. — Two species are known, one from China, the other from Burma.

P. hyalina. Collar and the bases of the abdominal segments white. Forewing black, with 2 hyaline patches, each consisting of several spots separated by the veins. Hindwing vitreous, with black distal margin, which is widened tooth-like behind middle. Two forms. — In true **hyalina** *Leech* (3 i) from Kiukiang, on the Yang-tse-kiang, the distal vitreous patch is narrower than the black space which separates it from the proximal window-patch. — In **thibetana** *Oberth.* (3 i) the distal patch is broader than the interspace, and the marginal band of hindwing, moreover, is narrower than in Leech's form. West China. *hyalina.* *thibetana.*

24. Genus: **Thyrassia** *Btlr.*

Antenna pectinated in ♂ and ♀, the teeth of the last 8 segments merged together, almost as in *Procris staticcs L.* Palpus short. Spurs very short, naked, thorn-like, one pair to hindtibia. Second median vein of forewing widely separate from angle of cell; cell of hindwing very broad at apex, the subcostal vein branching off at a considerable distance from the costa. — Larva (of *T. procumbens Snell.*, Java) on Vitis trifoliata. Dark yellow, paler beneath, with white hairs on the sides. Pronotum with a brown dorsal spot, abdominal segments with a subdorsal spot each which is white on the 1., 3., 6. and 7. somites. Pupa in a cocoon which is fastened to a leaf. — Indo-Malayan; one species extending to West China.

penangae. **T. penangae** *Moore* (3 i). Abdomen yellow, ringed with black. Forewing with two yellowish basal streaks, two subvitreous spots in the middle and a third before apex. Hindwing vitreous, costal margin and apex black. — Occurs in West China according to Leech; originally described from Penang.

25. Genus: **Zygaena** *F.*, Burnets.

Small, stout, black insects, sometimes with metallic gloss. Antenna very strongly developed; the club being considerably incrassate distally. Tongue long and strong. Legs rather short. Forewing elongate-oval, black or red, rarely spotted with white or yellow. Hindwing small, usually red, seldom black. — Larva strongly humpbacked, very soft, downy-haired. Pupa in a paper-like silky cocoon, the sheaths of legs and wings being loosely soldered together. The moths are mostly local, their stations being often restricted to a mountain, a meadow, etc. They appear mostly in large numbers at their special localities, swarming about flowers, which they suck, f. i. Scabious, Thistles, Eryngium, etc., their flight being slow and straight on. The body of these insects contains, as in the other Zygaenids, a yellow, acrid, oily liquid which renders them nauseous, protecting them not only against their enemies among the vertebrates, but apparently even against predatory insects, f. i. Asilids. Like all insects protected by the body-juices, they are extremely tenacious of life, enduring considerable wounds as well as resisting strong poison for some time (cyanide of potassium). They conceal themselves in no way, mostly resting conspicuously on stalks or sprigs, hardly taking to the wing when touched, so that one can often pick them off by the long antennae. The latter are not concealed beneath the wings when at rest, as in other Heterocera, but are held straight forward. The main locality for the genus are the Mediterranean coast districts, of Europe as well as of the Atlas countries and the Levant, where the Zygaenae occur in a great abundance of forms, which partly intergrade and are found in immense numbers of specimens. There are often several individuals of different species on a flower, which easily explains that hybridisation obtains here more often than in any other group of Lepidoptera. However, such copulations appear to be mostly without result. The Zygaenae are best killed by injection of some strong tobacco juice with the help of the hollow needle of a morphia-syringe. As in all protected Lepidoptera the specifically distinct forms are without exception very common at their localities, the commercial value depending solely on the accessibleness of these places. The number of species is largest in South Europe, North Africa and Asia Minor, thence decreasing rapidly in all directions. The pacific coast of Asia is reached by one species only and the higher North of Europe by two, while not one occurs in South Asia. Outside the Palaearctic Region there occur only a few species in South and East Africa, while two Palaearctic forms extend into the Punjab and the Nepalese valleys of the Himalayas.

The species are on the whole very similar to one another and also very constant, varying only in certain directions. There occur of nearly all species individuals for instance with yellow instead of red markings. The normally six-spotted species may exceptionally have five spots, and inversely. In species which bear a red belt the latter may sometimes be absent, and in non-belted forms the belt may appear in rare cases. The spots of the forewing may be edged with white and merged together. Lastly, the marginal band of the hindwing may be so widened as to more or less displace the red ground-colour. These various aberrations have in may cases received names.*)

rubicundus **Z. rubicundus** *Hübn.* (= erythrus *Boisd.*) (4 a). All the wings red, also the hindmargin, only the apex and distal margin of forewing bearing a black edge, which is a little more than 1 mm wide. — In Central and South Italy. Very local.

erythrus. **Z. erythrus** *Hübn.* (= saportae *Boisd.*; minos *Boisd.*) (4 a). Larger; antenna longer, with thicker club. The red colour of forewing restricted to 3 streaks, the distal one being wedge-shaped; moreover, irpina. only the basal third of the hindmargin of forewing is red. South France, Italy and Sicily. In ab. **irpina** magna. *Zickert*, from the Riviera, the cuneiform spots are confluent. — As **magna** (4 a) a very large form from the Abruzzi is sold by Staudinger; the posterior cuneiform spot is strongly widened and distally straight-truncate. — Larva dull greenish yellow, with heavy black dots subdorsally and yellow side-spots (Saporta); in some districts not distinguishable from the larva of *purpuralis*. On Eryngium and Thyme (Rouast). Hibernating; pupation at end of May. Imago in June and July; frequently sitting on Thyme and Eryngium.

purpuralis. **Z. purpuralis** *Brünnich* (= pilosellae *Esp.*; minos *Fuessl.*) (4 a). In this species the hindmargin of forewing (base included) is all black, while the red wedge-spots situated before it may be shaped entirely as in *erythrus Hbn.* An aberration with light yellow instead of red markings, already recorded by

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*) The editor tenders his best thanks to Mssrs. Burgeff (of Geisenheim) and Dziurzynski (of Vienna), who kindly compared the list of species here dealt with as to its completeness and very generously put at his disposal specimens for figuring.

Ochsenheimer, has more lately been named by Rühl ab. **grossmanni** (= lutescens *Tutt*). It is said to have been observed as a constant or at least prevalent form in certain very limited localities. In ab. **obscura** *Tutt* the entire wings, inclusive of the red colour, is darkened. — **sareptensis** *Stgr.-Reb.* (4b) is a large, somewhat paler, lighter red form from South Russia. — **diaphana** *Stgr.* (4c), from Tauria, has thinly scaled, strongly transparent wings, the central wedge-spot being distally strongly widened. — **nubigena** *Led.* (4c) is also a very thinly scaled form from the high mountains of Europe and Asia, having moreover (like many mountain-forms) a very shaggy body, like *Z. exulans*, with which it occurs occasionally together. — In the rather large form **smirnovi** *Christ.* (4c), from Turkestan, the distal wedge-spot is constricted before its dilated apex. — **pluto** *O.* (= pythia *Hbn.*) (4b) has a black apex to the hindwing and the central streak of forewing is entirely of even width, not in the least being dilated distally; in South Europe, as far north as Austria. — In **polygalae** *Esp.* (4b) the black interspaces between the red streaks have entirely disappeared the red being so extended (especially in ♀) that the forewing is only edged with black, differing from *rubicundus* in the hindmargin of forewing being black (though sometimes only narrowly); in the South, especially Northern Italy. — In **heringi** *Zell.*, from North Germany, the antenna is thinner and the central wedge-spot of the somewhat broader forewing extends to near the distal edge. — In ab. **interrupta** *Stgr.* (4b) the central streak is broadly interrupted and the posterior one often constricted in middle; more in the North of the area, among the name-typical form. — If all three streaks are interrupted, the red is separated into 6 spots, recalling the pattern of other Zygaenas; this form is ab. **sexmaculata** *Burgeff.* — Finally, there occur also specimens which have a red abdominal belt: ab. **cingulata** *Burgeff.* — Larva bluish white or light yellow; a subdorsal row of heavy black dots; head, pectoral legs and stigmata black. Fullgrown in May and June on various species of Grass, Trefoil, Thyme, etc. Pupa brown, posteriorly yellow; in a strongly convex yellowish cocoon. The imagines emerge after 3—4 weeks, flying on hill-sides and forest-roads, resting especially often on Thistles, Scabious and Eryngium; they are local, but appear here and there in large numbers. There are often several specimens on the same flower; they are lazy and can, without difficulty, be taken off with the fingers.

grossmanni. obscura. sareptensis. diaphana. nubigena. smirnovi. pluto. polygalae. heringi. interrupta. sexmaculata. cingulata.

Z. brizae *Esp.* (= scabiosae *Hbn.*) (4c). Smaller and weaker than the previous species, with considerably shorter antenna. The red wedge-spots are confluent, the basal two-thirds of forewing, apart from hindmargin, being all red, the distal edge of this area being straight and parallel to the edge of the wing. Extends from the Tyrol eastwards into Western Asia. — In **erebus** *Stgr.* (= manni *Kirby*) (4c), from Armenia, the hindwing is more broadly edged with black, which is the case also in **gallica** *Oberth.*, from Digne, the red colour of forewing being somewhat reduced in this form. — **corycia** *Stgr.* (4d), from Syria, is rather intensily coloured, but is very much smaller than typical *brizae*; the forewing strongly rounded and almost elliptical; the black marginal band of hindwing narrow but sharply marked. — Also of *brizae* there occur specimens with the red streaks interrupted: ab. **interrupta** *Hirschke*, and individuals with red abdominal belt: ab. **cingulata** *Dziurz.* — Larva grey-yellow; subdorsally black velvety spots behind which there are yellow spots, these bearing black setiferous dots; stigmata, pectoral legs and head black, the last with a light-edged frontal triangle. Fullfed in May on Cirsium arvense, and turning into a blackish, posteriorly yellow pupa, which lies in a silvery white cocoon. Imago in June and July, local, and not in such abundance as the preceding.

brizae. erebus. gallica. corycia. interrupta. cingulata.

Z. zuleima *Pier.* (= ludicra *Luc.*) (4d). A small, delicate insect with an almost naked body. The wedge-spots are narrow, being separated by broad black interspaces; the external streak angulate, hook-like, being extended close to distal margin. — In Algiers, on meadows, in spring till early May not rarely on Umbelliferae, for instance near Oran, on the parade-grounds of Constantine, etc.

zuleima.

Z. scabiosae *Scher.* (4d). At once recognized by the long, thin, almost filiform, antenna which is hardly incrassate apically. The red streaks of forewing more pear- than wedge-shaped, resembling prolonged drops. Widely distributed; all Europe from Scandinavia and Finland to the Mediterranean Sea, and from Spain eastwards far into Siberia. — Of colour-varieties are known: ab. **flava** *Pieszez* (ochre-yellow), ab. **flaveola** *Zickert* (orange-yellow), ab. **citrina** *Spuler* (light sulphur-yellow), and also melanotic specimens — ab. **hoffmanni** *Zickert* — as well as almost plain black individuals — ab. **nigerrima** *Zickert.* — In **orion** *H.-Sch.* (4d) the upper red drop-like spot is darkened in the middle resp. constricted, only its basal portion being reduced to a dot and the external portion appearing as an ovate spot, the hindwing bearing a black marginal band of more than 1 mm width. In Italy, also already in the Tyrol, locally very common. — In ab. **divisa** *Stgr.* (4d) also the lower streak is interrupted. In the South not rarely among the previous form. — ab. **transapennina** *Calb.* stands in between the last two forms. — In **subalpina** *Calb.* (4e) the black edge of the hindwing is very narrow, and the upper streak of the forewing is still continuous, while the posterior one is interrupted. Specimens of *subalpina* from the southern Alps with all the streaks interrupted are ab. **conjuncta** *Calb.* — **romeo** *Dup.* (4e) has the forewing as in *divisa*, the hindwing, however, being very narrowly edged with black. Riviera; North Italy. — In **neapolitana** *Calb.* (4e) all the streaks are separated into

scabiosae. flava. flaveola. citrina. hoffmanni. nigerrima. orion. divisa. trans-apennina. subalpina. conjuncta. romeo. neapolitana.

spots as in *divisa,* but the hindwing is much more broadly edged with black. From South and Central Italy. *nevadensis.* — **nevadensis** *Ramb.* (4e) is a very small and thinly scaled form from South Spain, which, in the arrangements of the spots, belongs to the form-group of *scabiosae,* but leads over to the following species in the shorter and more strongly clubbed antenna. — Larva golden yellow, white-hairy, a row of 9 black subdorsal dots; head and thoracical legs black, marked with white; stigmata black. Adult in April and May on Trefoil. Pupa yellowish brown, darker anteriorly and dorsally; cocoon golden yellow. The imago in June and July on mountain-meadows surrounded by forest, slowly flying up and down or resting on halms of grass. Though easily caught on the wing like all Zygaenas, the specimens of *scabiosae* found at rest fly hurriedly away when touched. Locally common, but not in abundance.

contaminei. **Z. contaminei** *Boisd.* (4e). This species, which is distributed from the Pyrenees to Andalusia, being more restricted to mountainous districts, corresponds in pattern to *scabiosae orion,* i. e. the anterior streak is rather short, the central one is separated into a minute basal dot and a large drop-like spot, and the posterior one, though continuous, is strongly constricted in the middle. The very gradually and evenly incrassate, but very strongly clubbed antenna distinguishes this species at once from all forms of *scabiosae,* with the exception of the small *nevadensis,* which is, however, much larger, being almost twice the size.

Z. sarpedon. This species is the first of a group of red-banded Burnets from the Mediterranean coasts which have only 3 red spots on the forewing: the anterior and the posterior wedge-spots and a small, rounded, drop-like spot corresponding to the distal portion of the central streak. — In the name-typical *sarpedon.* form, the small **sarpedon** *Hbn.* (4e), the colour is pale, but distinctly red; hindwing with a vitreous streak *trimaculata.* from the base to the middle. Spain; South France. — **trimaculata** *Esp.* (4f) is a little larger; the wings are entirely limpid, the red spots of the forewing being only feebly marked, while the hindwing is almost *balearica.* entirely transparent; Balearic Is., perhaps occassionally also among the previous. — **balearica** *Boisd.* (= sarpedon *H.-Sch.*) (4f) is considerably larger and more densely scaled than the 2 previous; hindwing beautifully *vernetensis.* red, narrowly edged with black. Spain, South France, and Piemont. — **vernetensis** *Oberth.* (4f), from the Pyrenees, has the forewing as in *balearica,* but the hindwing is black, with two red streaks, one each in and below cell. — Besides these (partly) geographical forms two aberrations have received names, the light *flava.* yellow one: ab. **flava** *Oberth.,* and the one with confluent spots: ab. **confluens** *Dziurz.* — *confluens.* Larva much variegated, green, with brown subdorsal and lateral lines, a subdorsal row of black dots, black stigmata, and black head edged with reddish; till June on Eryngium. Pupa in a brown cocoon. Imago flying in July and August on stubble and sunny fallow fields.

favonia. **Z. favonia** *Frr.* (= sarpedon *Hbn.,* cedri *Bruand*) (4g). This form belongs to a group of North African Burnets the pattern of the forewings of which reminds one much of the preceding species, while the abdomen is red from the middle nearly to the tip, which gives the insect a characteristic aspect and renders it easy to recognize even when it flies quickly past. The whole of Mauretania, everywhere common. *vitrina.* — ab. **vitrina** *Stgr.* (4g), which I found only at very limited localities, for instance near Constantine and at the cemetery-wall near Batna (Prov. of Constantine), is easily differentiated by the transparent wings. — *staudingeri.* ab. **staudingeri** *Aust.* (4f) is similar, but has only a narrow abdominal belt, so that one might mistake the *loyselis.* insect for a small *loyselis,* if it did not lack the red collar of the latter. — **loyselis** *Oberth.* (4fg) has always a rosy red collar, and a narrow but bright rosy red abdominal belt; otherwise resembling *favonia,* but most specimens considerably larger. Normally the red basal area of *loyselis* separated into 2—3 longitudinal spots, and the apical patch into 2 red rounded spots. If the spots are more or less confluent, we have *confluens.* ab. **confluens** *Dziurz.* — *valentini.* The insect described by Bruand as **valentini,** in which the red spots are enlarged, may possibly belong to an analogous *favonia*-form*). — *thevestis.* The finest form of this group is **thevestis** *Stgr.* (4f), in which there is a large lobate subapical patch. — All these varieties occur all over Mauretania, on hills, in dry beds of rivulets, and on waste ground. The commonest form is *favonia,* which is found in June on nearly all the thistles growing at the road-sides and in the fields. The ♀♀ have an extraordinarily thick body, and apparently scarcely take to the wing before copulation. *Thevestis* and *loyselis* are very local; the other forms occur together and fly also among the former varieties.

punctum. **Z. punctum** *O.* (4g). Represents the preceding African insect in the South of Europe. Position of the red spots as in *sarpedon,* but the apical spot enlarged, appearing washed out, being deeper red centrally and pale at the edges. Red abdominal belt always absent. Name-typical *punctum* occurs at the north-east coasts of the Mediterranean Sea, as far as Armenia; small, the markings of forewing more or less confluent, the hindmargin remaining broadly black. — In **dystrepta** *Fisch.-Wald.* (4 h), from S. E. Europe and Asia Minor, the hindmargin is only very narrowly shaded with black, the forewing being otherwise all blood-red except distal margin; this colour replaced by miniate in a specimen from Asia Minor received from Messrs. Staudinger and Bang-Haas under the name of **malatina** (4 h). — **italica** *Stgr.-Reb.* (4 h) is a more densely scaled and therefore brighter coloured form from South and Central Italy, the apical patch being distinctly separated from the basal area by a narrow black interspace, while in the much larger **contamineoides** *Stgr.* (= contaminei *Zell.*; dalmatina *H.-Sch.*) (4 h), from Spain, Italy, and Sicily, a broad interspace isolates the apical spot completely. — Larva greenish, with white dorsal line and subdorsal rows of black dots, below which there are larger yellow spots. Head and thoracical legs black, abdominal legs yellow; in May and June on Eryngium. The imago in July at very limited localities, but rather common, flying low.

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*) The larvae of these forms are not yet known; but I found at the flight-places of *favonia* some weeks before the appearance of this insect green-yellow, black-spotted Zygaena-larvae which had the habit of burying themselves as far as the centre of their body in the receptacle of various Corymbiferae, especially yellow thistles. I did not succeed in rearing them, but they were presumably the larvae of *favonia.*

dystrepta. *malatina.* *italica.* *contamineoides.*

Z. wagneri *Mill.* (4 hi). This species does not stand in close connection with any other. Forewing very broad and strongly rounded, extremely densely scaled and of very intense metallic gloss, with a violet or very dark blue tint, which is met with nearly to the same extent among the Riviera Burnets only in the otherwise quite dissimilar *stoechadis* and *maritima*. 5, rarely 6, mostly small spots on forewing are bright blood-red like the hindwing and have black edges when viewed obliquely. On underside all the spots sharply separated; in the ♀ the black margin of hindwing occasionally widened. S. E. France, especially in the neighbourhood of Nice. — In ab. **nigra** *Dziurz.* the red of hindwing is almost entirely replaced by black; while in ab. **giesekingi** *Wagn.* the central spots of forewing are reduced. — In ab. **achilleoides** *Wagn.* the 5. spot is enlarged and washed out. — Larva short and thick, strongly humped, dark green, paler at the sides; black subdorsal dots, below which there are honey-coloured spots; head black, pronotum white; in May on chalk hills, on Hippocrepis comosa.

wagneri. *nigra.* *giesekingi.* *achilleoides.*

Z. trifolii *Esp.* (4 i). Forewing densely scaled, black, glossy, with 3 red spots at base, in centre and near apex; the central one oblique, elongate, composed of two; hindwing with a black edge of about 1 ½ mm width. Europe except the high North, and Northern Asia as far as the Altai. — In ab. **lutescens** *Cockerell* the red is replaced by lemon yellow; in ab. **obscura** *Tutt* it is of a brownish tint; while in ab. **intermedia** *Tutt* is is paled to orange. — A large form with small spots, from the Bukovina, has been named v. **orientalis** by Hormuzaki, and Fuchs has designated as var. **gracilis** a dwarfed form from the Rheingau. — In ab. **orobi** *Hbn.* (4 i) the 2 spots composing the central patch are separated, while in **minoides** *Selys* (= confluens *Stgr.*) (4 i) the 3 red spots are broadly connected with one another, being sometimes merged together to a broad red area (as in 4 i 4). — ab. **palustris** *Oberth.* has normal markings, but is very large, nearly equalling in size *orientalis*. — In **trivittata** *Speyer*, which, like all the preceding forms, occurs among ordinary *trifolii*, but very rarely, the spots of the forewing are connected with one another longitudinally. — In ab. **basalis** *Selys* the distal spot is isolated, while the others are confluent. — In ab. **glycirrhizae** *Hbn.* the spots are transversely connected in pairs. — **syracusiae** *Zell.* (4 k) is a form with very broad distal marginal band to the hindwing, described from Sicily, but occurring also in Southern Italy, Spain, and especially North Africa, though in the last locality in less well characterized specimens (Fuchs). — In **seriziati** *Oberth.* (4 k), from North Algiers, the black is still more extended on the hindwing; this colour forms a complete or centrally interrupted band across the wing, occupying sometimes even the base, in which case only a small postmedian spot remains red. Oberthür figures this latter form without giving it a name; Dziurzynski calls it ab. **nigra** (4 k). — Larva green, when young, later pale yellowish; 2 subdorsal rows of velvety-black double-spots, another row of yellow lateral dots, between which there are the stigmata; in April and May on Trefoil. Pupa black, in a whitish yellow cocoon, frequently on the bark of roadside-trees which stand near clover-fields. I have found *trifolii* flying only in meadows on which there are temporarily water-pools; also the form *syracusiae* has been met with by me only at brooks in meadows and at ditches for draining, as well as in swampy meadows, in June. *Seriziati*, however, I have found also in dry meadows, but only near the sea-coast, in May.

trifolii. *lutescens.* *obscura.* *intermedia.* *orientalis.* *gracilis.* *orobi.* *minoides.* *palustris.* *trivittata.* *basalis.* *glycirrhizae.* *syracusiae.* *seriziati.* *nigra.*

Z. lonicerae *Schev.* (5 a). A little paler, more transparent, and larger than *trifolii;* the red more a deep pink. At once recognizable by the much longer, thinner and more pointed antenna, and by the shape of the forewing, which is longer, distally broader, but apically again more acute than in *trifolii*. Distributed all over Europe, going far north, everywhere common, also in the whole northern districts of Western Asia, eastwards as far as the Altai. — A number of colour-aberrations have been observed, occurring as rarities among ordinary *lonicerae*: ab. **citrina** (= flava *Oberth.*) is light yellow instead of red; in ab. **chalybea** *Aurir.* the red is darkened, and in ab. **carnea** *Spuler* flesh-colour. — ab. **eboracae** *Prest.* is the name of pale specimens with whitish fringes. — A very large form — **major** *Frey* (5 a) — represents the species in many valleys of the Alps, for instance at Faido, Airolo at the St. Gotthard railway, in Wallis, and other places of Southern Switzerland. — As in *trifolii* ab. *minoides* also here the red spots may be confluent, = ab. **confluens** *Selys*. — In ab. **rubescens** *Burgeff* the forewing has become almost entirely red in con-

lonicerae. *citrina.* *chalybea.* *carnea.* *eboracae.* *major.* *confluens.* *rubescens.*

privata. sequence of the extension of the spots. — On the other hand, the red spots can also be reduced to 4 small dots, — ab. **privata** *Burgeff.* — Larva dull white (♂) or greenish (♀); on the back rows of quadrangular black spots; above the legs a row of small black dots, above which there is a yellow line. Pupa black-brown, in a straw-yellow cocoon. Imago in July and later; on clearings in woods, several specimens being often found sitting on one flower.

angelicae. *doleschalli.* *sexmacula.* *confluens.* *transcarpathina.* **Z. angelicae** *O.* (5 a). Forewing steel-blue, with 5 spots, which are confluent on underside. Hindwing with a black distal margin of even width. The extreme tip of the antennal club has a yellowish silky gloss. — The yellow aberration already described by Ochsenheimer is named ab. **doleschalli** by Rühl. — ab. **sexmacula** *Dziurz.* has 6 spots. — In ab. **confluens** *Dziurz.* the spots are enlarged. — In S. E. Germany, Austria, and the Balcan Peninsula; in the North of the area in July, in the south earlier. — In **transcarpathina** *Hormuz.*, from the Bukovina, the spots are small and edged with black. — Larva yellow, very finely dotted with black, two rows of black triangles on the back; in June on Trifolium montanum. Pupa anteriorly black, in a golden-yellow cocoon.

stoechadis. *judicariae.* *dubia.* *campaniae.* *hadjina.* **Z. stoechadis** *Bkh.* (= lavandulae *Hbn.*) (5 b). Entirely black, densely scaled, with a metallic dark green (rarely blue) gloss. Forewing with 5 spots. Hindwing likewise black, with red dots in the centre, sometimes, especially in the ♀, also the base dusted with red. Exceptionally there appear 6 spots in otherwise normal black specimens. North-East Spain, and the French and Italian Riviera; very common. — In **judicariae** *Calb.*, from the Southern Tyrol, the spots of the forewing are thinly edged with white. — In ab. **dubia** *Stgr.* (5 b c) the red scaling of the hindwing is so extended that the black is reduced to a broad, sinuous, marginal band. According to this band being more or less narrowed by the expansion of the red colour, we have transitions towards *transalpina*, the figures of *medicaginis* and *charon Boisd.* and of *transalpina Hbn.* representing such forms. Most similar to *transalpina Esp.*, dealt with below, is a form sold by Messrs. Staudinger & Bang-Haas as var. **campaniae** (5 c), which comes from Italy. — As **hadjina** (5 c) I received from the same firm a large 6-spotted Zygaena which resembles a gigantic *filipendulae*; from Tauria.*) — Larva dorsally deep yellow, with 2 subdorsal rows of black oval spots; sides lighter, with a row of black dots; underside greenish; in May adult on Dorycnium suffruticosum. Pupa brown, in a light-yellow cocoon. — The imago has a fast and active flight, often sailing for short distances without moving the wings, appearing quite black. Near Genoa, Pegli and other places at the Italian Riviera this insect is, next to *Z. transalpina maritima*, the commonest Burnet throughout June. Sometimes I have seen small swarms flying about the tips of oak-trees at a height above the ground at which I have never observed other Zygaenae.

cynarae. *turatii.* *tricingulata.* *genistae.* *centaureae* **Z. cynarae** *Esp.* (= millefolii *Esp.*) (5 b). 5-spotted, the body entirely without hairs, with metallic green gloss; wings very sparsely scaled, the colour appearing pale. The abdomen bears a red ring which is more distinct at the sides than above. From the Rhine valley southwards to the Riviera and eastwards to the Ural and the shores of the Black Sea. — In ab. **turatii** *Stdfss.* (5 c) the abdominal belt is entirely missing above, appearing only as a lateral spot; North Italy, Dalmatia; near Pegli, at the Riviera, I met constantly with this form, while it occurs elsewhere only sparingly among the type-form. — ab. **tricingulata** *Burgeff* has 3 abdominal belts, which, however, are usually red only above and laterally, not below. — In **genistae** *H.-Sch.* (= dahurica *H.-Sch.*) (5 d), from South France, Hungary and the Tyrol, the forewing is paler and more transparent. — **centaureae** *Fisch.-Wald.* (5 d) has a stronger antenna and the 5. spot is prolonged towards the hind angle. — Larva greenish above, yellowish grey at the sides; subdorsal black dots, near which there are yellow spots; head greyish green; till June on Peucedanum oreoselinum. Imago in June, in the north of the area from July. Sluggish and clumsy insects; the individuals occur more singly, there being apparently no decided flight-places as is the case with other Burnets.

anthyllidis. *flava.* *caucasica.* **Z. anthyllidis** *Boisd.* (= erebus *Meig.*) (5 e). With pale collar and light-red belt. The wings strongly widened, and especially the 6 spots of forewing enlarged, being more or less quadrangular. Pyrenees. — ab. **flava** *Oberth.* is the yellow aberration. — In **caucasica** *Stgr.-Reb.* (5 e) the pale collar is missing, and the two distal spots touch each other or are confluent; from the Caucasus. — Larva yellow, with the head, thoracical legs and transverse bands black; on Trefoil. Pupa in a white ovate cocoon of which the frontal end is directed downwards (Oberthür).

filipendulae. *flava.* *chrysanthemi.* **Z. filipendulae** *L.* (5 e f). 6 rather large spots on forewing; no abdominal belt. At once distinguishable from the *transalpina*-forms by a different red, broader wings, and especially by the underside of the forewing having a greyish silky lustre and bearing indistinct red clouds. Throughout Europe, except the high North, also in Asia Minor and Armenia. — ab. **flava** *Hobson* is the (accidental) yellow aberration. — Also the occurrence of ab. **chrysanthemi** *Bkh.* (5 e), in which the spots of forewing and the hindwing are brown, appears to be due to chance, as it has formerly been met with several times in some numbers

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*) In Staudinger-Rebel, Cat. Lep. Pal. Faun., this form is enumerated as a transition towards *filipendulae.*

near Stralsund, while more lately only single specimens have been found here and there, for instance near Paris.
— In ab. **cytisi** *Hbn.* (5f) the spots of the forewing are confluent in pairs, while in ab. **confluens** *Dziurz.* *cytisi.*
also the pairs are joined together. — In ab. **bipunctata** *Selys* the proximal pairs are merged together, while *confluens.*
spots 5 and 6 are free; in ab. **communimacula** *Selys* the distal pairs are confluent, while the basal spots *bipunctata.* *communimacula.*
are separate. — In ab. **conjuncta** *Tutt* all the spots are merged together, being longitudinally connected
with one another in ab. **trivittata** *Tutt.* — **manni** *H.-Sch.* (= arctica *Sparre-Schn.*) (5f) is a small, thinly *conjuncta.*
scaled, strongly hairy form due to cold, spot 6 often being reduced; in the higher Alps and in the high *trivittata.*
North. — **tutti** *Reb.* (= hippocrepidis *Steph.*) has a broad, black, sinuous marginal band to the hindwing. *manni.*
— **ochsenheimeri** *Zell.* (= filipendulae major *Esp.;* transalpina *O.*) (5g) is a large, bright-coloured mountain-race *tutti.*
from South Europe. — In **ramburi** *Led.* (5f), from Greece, Asia Minor and Syria, the spots are confluent *ochsenheimeri.*
in pairs in such a way that the reduced 6. spot appears to be a projecting portion of the much enlarged *ramburi.*
5. — **gurda** *Led.*, from Messina, is similar to *ramburi* and has, like the latter, a transparent longitudinal *gurda.*
fold in the hindwing; but the forewing is longer, narrower and more pointed; the distal pair of
spots is merged together to a large patch, which is larger than the patch formed by the united median
spots, while the reverse is the case in *ramburi.* — Larva yellow, with subdorsal rows of black spots, above
the abdominal legs rows of black dots; in May and June on grass and various low plants. Pupa yellowish,
anteriorly brown; in a sulphur-yellow cocoon. The imago very common from June to August at road-sides,
on roads in woods, and in mountain-meadows, especially frequenting the flowerheads of Thistles and Scabious.

Z. transalpina *Esp.* (= medicaginis *O.;* charon, angelicae *Boisd.*) (5g). Very highly coloured: metallic *transalpina.*
black-blue or -green, with 6 small, widely separated, somewhat black-edged spots. The very bright red
hindwing is broadly margined with black. On the underside of forewing all the red spots are merged
together in the name-typical form. — ab. **flava** *Dziurz.* is the (accidental) light-yellow aberration. — ab. *flava.*
ferulae *Led.*, which occurs in the southern Alps and extends sporadically into Southern Germany, is paler *ferulae.*
red and has still smaller spots on the forewing than name-typical *transalpina,* but is hardly separable from
it as a distinct form. — In ab. **nigricans** *Oberth.* (= brunnea *Dziurz.*) the red has changed into coffee- *nigricans.*
colour, as in ab. *chrysanthemi* of *filipendulae.* — **boisduvali** *Costa* (= xanthographa *Germ.*) (5i) has yellow *boisduvali.*
spots on the forewing (5 or 6), and a yellow streak or heart-shaped spot on the otherwise black hindwing;
South Italy. — ab. **zickerti** *Hoffm.* is similar to *boisduvali,* but the hindwing is all black, being without *zickerti.*
the yellow central spot. Flying sparingly among the preceding. — **astragali** *Bkh.* (= hippocrepidis *Hbn.;* *astragali.*
angelicae *Boisd.*) (5gh) is of a magnificent vermilion colour, with 6 large spots on the forewing and a
narrow marginal band to the hindwing. The forewing below is uniformly vermilion (without separation into
spots), with black margin. This is the northern form, which occurs in France, South and Central Germany,
and Belgium, being said (probably erroneously) to extend as far as Sweden. — Specimens of this form
with an abdominal belt are named by Hirschke *astragali* ab. **cingulata.** — ab. **miltosa** *Cand.* is founded *cingulata.*
on a small specimen from La Rochelle in which the spots of the upperside are also confluent. — *miltosa.*
sorrentina *Stgr.* (5i) resembles *boisduvali,* but the spots are red, and the spot of the hindwing is often *sorrentina.*
very small; Southern Central Italy (Naples). — **calabrica** *Calb.* (= spicae *Stgr.*) (5i) is quite black, with *calabrica.*
very small red spots, the spot of the hindwing being only vestigial, the insect therefore resembling
stoechadis; South Italy. — **maritima** *Oberth.* (5h) is, like the name-typical form, very bright red, but *maritima.*
the black margin of the hindwing is wider and more sinuate; the (6) spots of the forewing below are
not confluent; Riviera. — **italica** *Dziurz.* (5h) the same, but has only 5 spots; Northern Italy. — Larva *italica.*
green, with black dorsal stripe, and yellow lateral line, above which there are triangular black spots; in
May adult on Astragalus, Hippocrepis, etc. Pupa black, abdomen greenish white; in a light-yellow cocoon.
The imagines are lively and active insects, taking perhaps quickest to the wing of all the Burnets. They
likewise simulate death when suddenly touched, but revive soon and whiz quickly away, the flight being
fast. Though the form *astragali* extends beyond the 50. degree of latitude, being still common near Mombach
(Mainz), Darmstadt, etc., South Europe, especially Italy, must be considered the principal locality of
the species, the forms here flying occurring from May to July in really surprising numbers; *maritima* flies
in great abundance even in dull weather and till night-fall on the southern slopes of the Riviera, near
Genoa, Pegli, Savona, etc., *transalpina* being likewise very common in the southern valleys of the Alps of
Ticino, extending into the North Italian plains.

Z. dorycnii *O.* (= dahurica *Dup.*) (5d). With 6 spots and a red belt, which does not reach all *dorycnii.*
round the abdomen as in the otherwise similar *peucedani,* not being continued on the underside. Russia,
Armenia and Persia. — In **senescens** *Stgr.* (5e), from Tauria, the anterior basal spot of the forewing, the *senescens.*
hindwing and the abdominal belt are dark rose-colour, the other spots of the forewing being white, with a
yellow tint.

Z. ephialtes *L.* (= falcatae *Boisd.*) (5ik). Forewing with 6 spots; the basal pair red, the others *ephialtes.*
white; hindwing with a white dot. Abdomen with red belt. From South Germany and Switzerland, eastwards
to Greece and South Siberia. — **medusa** *Pall.* (5k) is the form without the 6. spot: being especially *medusa.*
frequent in the eastern districts of the area. — In the west of the area, especially in Northern Italy, South

coronillae. trigonellae. icterica. aeacus. princi. aurantiaca. peucedani. athamanthae. guenneri. metzgeri. sophiae. aemilii. bahri. wutzdorffi. araratica.

Germany, Austria, and also in some of the Balcan States, there occur two forms which are marked like *ephialtes* resp. *medusa,* but have the 2 basal spots of the forewing and the abdominal belt deep yellow instead of red; these forms are **coronillae** *Esp.* (6a) with 6 spots, and **trigonellae** *Esp.* (6a) with 5 spots. — Likewise in Austria there occur, often together with other forms at the same places, two varieties in which the spots of the forewing as well as the whole hindwing except the black margin are yellow; these are **icterica** *Led.* (6a) with 6 spots, and **aeacus** *Esp.* (6b) with 5 spots on the forewing. Sometimes the yellow colour has a strong reddish tint; such forms are named by Hirschke **princi** (6b), if there are 6 spots, and **aurantiaca,** if there are 5. — Also red forms are found which are similar in appearance to red-belted *filipendulae* resp. *trifolii* ab. *orobi,* being also the most northern forms. They are **peucedani** *Esp.* (= hippocrepidis *H.-Sch.*; aeacus *Hübn.*) (6b) with 6 spots, and **athamanthae** *Esp.* (= veronicae *Bkh.*) (6c) with 5. The red colour of the hindwing of these forms may more and more be replaced by the black marginal band, being finally represented only by a red central spot. These forms are ab. **guenneri** *Hirschke,* if there are 6 spots, and ab. **metzgeri** *Hirschke,* if there are 5. — We have further to mention a group of aberrations in which the hindwing bears two small spots instead of a single white or red one. This modification is known of nearly all the above-mentioned forms and has received special names. Thus, *ephialtes* with 2 white spots to the hindwing bears the name **sophiae** *Favre,* the corresponding form of *medusa* being **aemilii** *Favre,* while *coronillae* with 2 spots is **bahri** *Hirschke* and the corresponding *trigonellae*-form **wutzdorffi** *Hirschke.* Lastly there is another Burnet in which the forewing is white-spotted, the hindwing being entirely black, and the abdomen black without belt: this is **araratica** *Stgr.* (5k), from Armenia, which was placed here by former authors, while others consider it a form of *dorycnii* (Spuler). — Larva yellow or green, reddish yellow at the sides, with pale belts; a dorsal stripe and subdorsal rows of spots black; above the legs rows of black dots; on the whole similar to the larva of *filipendulae*; in May adult on Vetch, Trefoil, Thyme, Eryngium, Plantago, etc., the black pupa in a white-yellow silky cocoon. The imagines fly in July in meadows, venturing even into gardens; they are especially often found resting on the heads of thistles standing near the edges of woods and on fallow ground, sometimes one finds only one form at a certain place, sometimes several forms fly about at the same time in one field, copulating together, the offspring, however, not having mixed or transitional characters. Occasionally specimens of this species have been met with which were in copula with individuals of entirely different species.

ecki. cingulata.

Z. ecki *Christ.* (6c). Little is known of this rather isolated Burnet, which does not stand in close relationship to any other, not being allied to *ephialtes* or *exulans,* nor to *anthyllidis,* behind which it is placed in the catalogue of Staudinger-Rebel. The dull dark grey forewing bears 6 pinkish crimson spots of which the 2 distal ones are slightly confluent; hindwing of the same tint, with rather broad black margin and reddish grey fringes. The abdomen is usually black, but occurs also with red belt, = **cingulata** *Hirschke.* Persia.

exulans. flava. confluens. fulva. vanadis. dilatata. exsiliens.

Z. exulans *Hochenw.* (= subochracea *White*) (6c). Strongly hairy, thinly scaled, with faint coloration, relatively slender antenna and broad wings. Forewing 5-spotted, the spots light rosy-red on a grey, rather transparent, ground. Hindwing with dull grey margin which is wide especially at the apex. Shoulders with grey or faintly pink hairs, fringes of the same colour. An alpine insect, from the highest meadows of the Alps, Pyrenees, Apennines, and the Scotch mountains, the species being found everywhere in abundance at its flight-places. — ab. **flava** *Oberth.* is the pale yellow form, which has been met with near Lauterat. — In ab. **confluens** *Strand* the 4 proximal spots are confluent, at least in pairs. — Among the name-typical form there occur rarely reddish yellow specimens, = ab. **fulva** *Spuler.* — **vanadis** *Dalm.* is the northern representative of the species, from Scandinavia and North Russia; still more transparent and with still more shaggy body, but the intermixture of grey hairs on the thorax in absent. It may be mentioned, however, that specimens coming close to this form are occasionally found in the Alps. — In ab. **dilatata** *Burgeff* the 5. spot is extended to the distal margin. — **exsiliens** *Stgr.* (6c) is an eastern form, from the Altai, with clearer colour and pattern, the whole apical area of the hindwing being grey, occupying $^1/_3$ of the wing. — Larva of *exulans* velvety-black; intersegmental rings and lateral spots yellow; in June adult on Azalea concumbens. Pupa black, in a whitish yellow cocoon. The imagines fly in July and August, being extremely common at their flight-places. In the Alps one finds them often in swarms covering the clusters of flowers on the mountain-meadows.

magiana. hissariensis.

Z. magiana *Stgr.* (7b) is a pale-coloured, somewhat transparent, Burnet from the mountains near Samarkand, about the habits of which little definite is known. — The ab. **hissariensis** *Gr.-Grsh.,* which is connected with the preceding by all intergradations and which occurs in the same country, has the spots of the forewing small and sharply defined; the 6. transverse spot and the vestiges of the abdominal belt which appear occasionally are without weight in distinguishing this form; from Virgil Gazi, end of July.

corsica.

Z. corsica *Boisd.* (6d). A peculiar small Burnet with 5 almost equal-sized spots which are very round and glossy bright red, the ground-colour between them having in certain aspect a somewhat brassy lustre. — In May and June in Sardinia and Corsica. — Larva light grey-blue, at the side a dark line, and on the back a white one, along which there are black spots; in May on Santolina nicana. Cocoon light brown. The moths in June and July, on sunny slopes, especially frequent at higher altitudes.

meliloti. flava. confusa. ehnbergi. dahurica. mongolica. italica. teriolensis. sicula.

Z. meliloti *Esp.* (= viciae *Schrk.*, loti *Hbn.*) (6 d). A rather small, slender, delicately scaled Burnet, with relatively thin antenna and usually 5 spots, almost resembling a dwarfed *trifolii*, but the colours paler; only in the name-typical form the hindwing more narrowly edged with black. Distributed from Sweden and Livonia to the Mediterranean coasts and from the Riviera to Siberia and Mongolia. — ab. **flava** *Burgeff* is the light yellow aberration, which may occur everywhere. — In ab. **confusa** *Stgr.* (6 d) the red spots of the forewing are confluent; found in Western Asia. — ab. **ehnbergi** *Reuter* is a small form from North Europe, with reduced spots on the forewing and a broad black margin to the hindwing. — In **dahurica** *Boisd.* (6 d) the coloration is altogether brighter and the insect more robust, the antenna being especially stronger; the wings more densely scaled; not restricted to Asia, but occurs already in East Europe. — **mongolica** *Stgr. & Reb.*, from nothern East Asia, has an obtuse antennal club, and a broader, beneath darker, forewing. — **italica** *Caradja* (= nigra *Dziurz.*) (6 d) has 5, extremely rarely 6, often small spots on the forewing and an almost black hindwing, which bears in the centre a narrow red streak; in Liguria, where I found them especially frequent on meadows in mountain-forests near Pegli, occurring there commonly, but being restricted to small flight-places. — **teriolensis** *Speyer* (6 e) is nothing but pale-coloured *charon* from the southern Alps and the Apennines. — In **sicula** *Calb.* the distal spots are merged together; Sicily. — All these forms have black non-belted abdomina.

stentzi. decora. annulata.

There occur, however, also red-belted forms. Red-belted specimens of the ordinary 5-spotted *meliloti* are ab. **stentzi** *Frr.*; very rare. Though apparently occurring everywhere among the typical form, one may nevertheless examine many thousands of specimens of *meliloti* without finding among them a single *stentzi*. — The 6-spotted *(charon-)* form with red belt is ab. **decora** *Led.* (= cingulata *Stgr.* i. l.) (6 e), and the red-belted *dahurica* from South-East Europe is ab. **annulata** *Caradja*.

ledereri. laphria.

The strongly aberrant **Z. ledereri** *Stgr. & Reb.* (6 e) is perhaps best placed here, showing however also close affinities to *filipendulae*, near which it is put in Staudinger & Rebel's catalogue. It is a rather small insect from the coasts of the Black Sea, bearing 6 large, quadrate, bright rose-coloured spots on the forewing, the hindwing being of the same colour and having a very narrow black margin; abdomen without belt. The specimen here figured from the Staudinger collection was kindly placed at our disposal by Herr Bang-Haas. — Perhaps *laphria H.-Sch.* is the same as this species, while I cannot identify **laphria** *Frr.*, which has been recorded from Armenia.

The caterpillar of *meliloti* is pale green; the dorsal line white, the dorso-lateral ones yellow, laterally of these a series of yellow spots and black dots; head black; in May on Trefoil and Vetch. Pupa yellowish, anteriorly black-brown, in a bright-yellow cocoon. Though this moth is very weak, it flies nimbly and sometimes rather high. When being caught they first sham death, but then suddenly whiz away, generally ascending at once. The flight-places appear to be very limited in size, being often restricted to a few acres, the insect being there frequent, though never occurring in such abundance as many other species of *Zygaena*.

niphona.

Z. niphona *Btlr.* (= christophi *Stgr.*) (6 e). The only Burnet from East Asia. Rather large, sparsely scaled, 5-spotted, with rather wide red abdominal belt. Club of antenna strongly incrassate at apex. The insect has the appearance of a large *meliloti*, but the body is strong and robust, the flight however being nevertheless not at all fast. Though the species varies considerably, some specimens being 6-spotted and resembling therefore *Z. peucedani*, there are no local races. The abdominal belt occupies mostly 2 segments, but is sometimes restricted to one segment, the posterior portion of the abdomen being occasionally all red. The species is widely distributed in Japan, especially at low altitudes of the central mountains, near and on the Fujisan; probably more sporadic in Amurland, since Graeser did not meet with it.

graslini. confluens.

Z. graslini *Led.* (6 f). The 6 spots of forewing confluent in pairs, there being a basal, central and marginal red area separated by black bands. Asia Minor to Kurdistan and Mesopotamia. — In the form **confluens** *Oberth.* (6 f), from Syria (especially the neighbourhood of Beyrut), the basal and central areas are also confluent, the wing being red from base beyond middle.

oxytropis. cingulata. confluens.

Z. oxytropis *Boisd.* (6 f). Rather small, on forewing with 6 quadrate spots which are finely edged deep-black, the distal pair being more or less broadly united. Throughout Italy, especially frequent at the Riviera, at the Italian as well as the French side. — There occur also specimens with red abdominal belt, ab. **cingulata** *Zickert*, and individuals with confluent central spots, ab. **confluens** *Zickert*. — The moth flies in May and does not seem to be restricted to definite flight-places, but is found singly among the swarms of other Burnets.

lavandulae.

Z. lavandulae *Esp.* (= spicae *Hbn.*) (6 g). For the greater part metallic blue-black, inclusive of the hindwing, being superficially similar to *stoechadis* and *transalpina calabrica*; however, *lavandulae* is at once distinguished by the white collar. The name-typical form, from the Riviera and the adjacent districts of Spain, has a black, red-spotted hindwing, the red spots on the underside of the forewing being separate. — *consobrina.* In the form **consobrina** *Germ.* (6 f), from Digne in South France and probably also occurring elsewhere, the red spots on the underside of the forewing are confluent and the whole basal half of the upperside of the hindwing is red. — Larva much variegated, being longitudinally striped with white, grey and brown, and bearing rows of yellow dots and a short brown pile; underside red. In winter on Dorycnium; pupating in a white ovate cocoon. Pupa yellowish grey, anteriorly black. As in *oxytropis* the moths do not appear to be so much confined to definite flight-places as other Burnets, occurring always more singly. They fly in spring, sitting often on stalks of grass, head downwards, and seem to visit flowers less often than do other Zygaenae.

rhadamanthus. **Z. rhadamanthus** *Esp.* (6 g). Forewing strongly transparent, glossy grey, with 6 red spots, the 2., 3., 4. and 5. being edged with black at the proximal and distal sides. Riviera and Catalonia. — *cingulata.* **cingulata** *Led.* (6 h) has a red belt. This is a normal form in Spain, while in Liguria only single individuals of it are found among typical specimens. — *kiesenwetteri.* **kiesenwetteri** *H.-Sch.* (= stoechadis *Boisd.*) (6 h) has quite a different aspect on account of the deep black ground-colour of the forewing and the black hindwing, resembling *lavandulae* or *stoechadis*, but the black edges of the spots of the forewing are easily visible on the black ground. *algarbiensis.* **algarbiensis** *Christ.* (= roederi *Stgr.*) (6 h), from South Portugal, is similar, but the 6. spot of the forewing is entirely obsolete or only slightly vestigial. — Larva variegated, grey, black, longitudinally striped with white and yellow, with red collar; in April full-grown on Dorycnium. Pupa in a white oval cocoon. The moths in spring till May, frequently sitting on stalks of grass.

cuvieri. **Z. cuvieri** *Boisd.* (6 h). This large fine Burnet has rosy-red wings, the forewing being divided into 3 areas by two black-grey bands; a broad collar and an abdominal belt rosy. Inhabits Anterior Asia, *manlia.* from Syria through Mesopotamia to Turkestan. — In **manlia** *Led.* (6 h), from North Persia, the body has an equally broad rosy red collar and abdominal belt, but the blackish bands separating the red areas of the forewing are much broader, the distal area being represented by an irregular half-divided patch. — ab. *confluens.* **confluens** *Oberth.*, discovered in Mesopotamia, has the wings entirely rosy red, only at the costal and inner margins of the forewing there remain small black triangles.

tamara. **Z. tamara** *Christ.* (7 b). One of the finest Zygaenae. All the wings bright yellow, with a delicate rosy tint, the distal margin being black; forewing divided by 2 black transverse bands into 3 areas of *rubra.* nearly equal size. Antenna exceedingly long and strong, the abdomen being broadly belted with red. — *daemon.* In **rubra** *Bang-Haas* i. l. (7 b) the hindwing is rosy red instead of yellow, while in the form **daemon** *Christ.* (7 b) the fore- and hindwing are red. All 3 forms occur together in Armenia, but are found only in limited districts.

mitisi. **Z. mitisi** *Dziurz.* has a yellow collar, and yellow spots on forewing, which are confluent except the distal pair, the hindwing being bright yellow with black apical area; from the Caucasus.

cambysea. **Z. cambysea** *Led.* (6 i) is rosy red like *cuvieri*, but differs in the body being entirely black, without *rosacea.* red collar and belt; Iran, Turan. — In the form **rosacea** *Rom.* (6 i) the spots of the forewing are so merged together that the wings appear almost evenly carmine. Representing the species in Armenia; but it is not probable that this insect occurs there alone without the first described form.

huguenini. **Z. huguenini** *Stgr.* (6 i) is a large heavy-built Zygaena from the Pamir. Instead of the 3. pair of spots the forewing bears a larg patch occupying the whole marginal area; the 1. and 2. pair of spots of the forewing are separated by a black transverse band, the spots of each pair however being united.

haberhaueri. **Z. haberhaueri** *Led.* (6 i). With red collar, but without red belt. On forewing obliquely from costa to anal angle an evenly wide greyish black band separating a triangular marginal patch from the red area of the wing, this area moreover being costally incised at the basal third or divided by a slight band. In Armenia, apparently in localities where for a long while past no collections have been made.

sedi. **Z. sedi** *F.* (6 k). In this insect the spots of each pair are merged together to large light red patches, these being separated from each other only by thin lines of the transparent ground-colour. Abdomen without belt. Coasts of the Black Sea.

cacuminum. **Z. cacuminum** *Christ.* (6 k). This species reminds one in pattern of the *carniolica*-group, the 6. spot of the forewing being parallel to the distal margin. But the colour of all the spots of the forewing as well as of the hindwing is a dull purple, as it hardly occurs again in the whole genus. From Iran.

laeta. **Z. laeta** *Hbn.* (♂ 6 k, ♀ 7 a). Collar and patagia as well as the entire abdomen (except base) red; also the wings testaceous red except some black spots on the forewing. From the Tyrol through Austria-*mannerheimi.* Hungary and the Danubian countries to Turkey and South Russia. — In **mannerheimi** *Chard.* (7 a) the black spots of the forewing, moreover, are reduced to dots, which sometimes appear also dusted with red: in the Ural and at the coasts of the Black Sea. — The Castilian **ignifera** *Korb* (7 a) is perhaps a western *ignifera.* form of this otherwise East European species. However, this insect approaches closely also the North African *algira*, having like this a very bright red forewing which bears only minute black dots; in *ignifera*, however, the abdomen is always conspicuously red in its posterior half, being always entirely black in *algira*. — Larva of *laeta* light bluish green, with white dorsal and lateral lines, along which there are black dots; in June full-grown on Eryngium. Pupa yellow, anteriorly dark brown, in a whitish cocoon. The moths in July and August on dry hill-sides, on Thyme. During their slow flight the entirely red abdomen is especially conspicuous, the flying insect bearing on that account a distant resemblance to certain southern Hemiptera.

Z. lydia *Stgr.* (7 a) reminds one in pattern already of the following species, *achilleae*, but the wings *lydia.* are densely scaled and the dark ground-colour of the forewing has a strong metallic gloss; the intensely deep red collar is a further characteristic. From Tauria and Kurdistan. — The very similar **cremonae** *cremonae.* *Stgr.* (7 a), from the Libanon, has in addition to the red collar a red abdominal belt, the distal patch of the forewing being occasionally somewhat constricted in the centre. In *lydia* as well as *cremonae* the very bright scarlet spots of the forewing are united in pairs.

Z. achilleae *Esp.* (= triptolemus *Hbn.*) (7 c). This 5-spotted Burnet is recognizable by the 5. patch *achilleae.* being composed of 2 large trilobate oder reniform confluent spots: the patch has mostly the shape of a triangle with the angles rounded off, one corner pointing towards the apex of the wing. The forewing has not the dark metallic ground of most Burnets, but shows on the disc a greyish yellow tint, which has sometimes a slight silky gloss. The insect is very widely distributed, reaching the North European coast in Belgium and extending in various local races southwards to the Mediterranean, occurring from Spain as far as the Altai. — The ab. **flava** *Rom.* (7 d) is the lemon-yellow aberration, while ab. **brunnea** *flava.* *Dziurz.* is coffee-brown: ab. **cingulata** *Dziurz.* has a red belt, and in ab. **confluens** *Dziurz.* the 4 proximal *brunnea.* spots of the forewing are united in pairs; ab. **dziurzynskii** *Hirschke* has a belt and confluent spots. All *cingulata.* *confluens.* these forms appear, more or less rarely, among the normal form, not being confined to a definite patria. — *dziurzynskii.* In **viciae** *Hbn.* (= janthina *Boisd.*) (7 c) the 5. spot of forewing has assumed a more rounded shape in *viciae.* consequence of the disappearance of the lateral lobes, being however still so irregular and its edges so washed out that it is hardly possible to mistake it for any other 5-spotted species: more in the South of the area of distribution. — **bellis** *Hbn.* (7 c) is a considerably larger mountain-form from the southern Alps, the *bellis.* Apennines and various other mountain-chains, as far east as the Altai; recognizable, besides the much stronger and heavier built, also by the denser scaling and more conspicuous coloration. — In **tristis** *Oberth.* (7 d), *tristis.* from the higher Pyrenees, the red spots, of which the 5. is a mere oblique streak, almost disappear on the transparent dark grey ground, and the vitreous grey of the hindwing occupies also the apex, which is red in other *achilleae*-forms. — In the Syrian **antiochena** *Stgr.* (7 d) the red spots are more carmine and have a *antiochena.* tendency to becoming confluent, while in **arragonensis** *Stgr.*, from Spain, they are often actually merged *arragonensis* together. — This is also the case in **phoenicea** *Stgr.* (7 d) to such an extent that almost every vestige of *phoenicea.* the ground-colour has disappeared from the disc: all the wings are uniformly red, the forewing being edged with blackish only at the apex, so that at first sight one might mistake the insect for *Z. rubicundus*, if the built of the body and shape of the antenna did not prove its true relationship; Kurdistan. — Lastly, a very conspicuous form is **bitorquata** *Mén.* (7 d); the ground-colour of the forewing is a silky yellowish grey, *bitorquata.* with which the narrow black margin sharply contrasts: from the coasts of the Black Sea. — Larva green, with paler dorsal and darker lateral line; along the former 2 rows of dark dots, below which there are yellow spots: head black. Till June on Astragalus, Esparcet and Vetch. Pupa yellow, anteriorly black; in a white cocoon. The moths occur in summer, in Central Europe in July and August, in the South in June: they use to sit on Scabious and Thistles, often several specimens together on a flower-head. Their favourite flight-places in Central Europe are the outskirts of woods, in South Europe hill-sides.

The large, red-belted **Z. armena** *Ev.* (7 c), from Armenia, is perhaps best placed here; the large *armena.* red spots are situated in light clouds as it were. — Also of this insect a yellow form is known: ab. **flava** *Rom.* *flava.*

Z. fraxini *Mén.* (= oribasus *H.-Sch.*, carneolica *Freyer*, rogdana *Boisd.*) (7 e) is the first of a series *fraxini.* of species from Western and Central Asia. The 2 basal spots of the forewing are united to a large vivid red patch which occupies the entire basal area. Of the central pair of spots the lower one is always much the larger, if the two spots are not merged together; the distal spots are united to a severally incised, often very irregular patch. The red spots are partly edged with white, the abdomen being always entirely black in the name-typical form. Armenia. — **haematina** *Koll.* approaches the preceding, but is much smaller and *haematina* more narrow-winged. In this form spot 4 is more rounded and there is a red collar, which is absent from *fraxini*. Rebel considers *haematina* a distinct species from an examination of the type contained in the *perdita.* Hofmuseum at Vienna; from Persia. — In **perdita** *Stgr.*, from the Caucasus, the central spots are white, *scovitzii.* not being or scarcely centred with red, and the hindwing is broadly edged with black. — **scovitzii** *Mén.* (= sogdiana *Ersch.*) (7 e) has a broad rosy red collar and sometimes a red abdominal belt, on the hindwing a small, black, usually triangular spot being attached to the middle of the narrow black distal margin; *separata.* Persia and the Pamir. — In ab. **separata** *Stgr.* (7 e) the distal spots are narrowly but distinctly separated *erschoffi.* from one another; Southern Fergana. — **erschoffi** *Stgr.* (7 f) has spots 5 and 6 often widely separate, standing side by side rather than one below the other; collar and 1—2 abdominal segments red, sometimes *kavrigini.* also the shoulders, as in our last figure; Pamir. — **kavrigini** *Gr.-Grsh.* (7 f g) has the abdomen mostly *kohistana.* entirely red, inclusive of base; from Buchara. — In the likewise Central Asiatic **kohistana** *Gr.-Grsh.* on *rosinae.* the contrary there are only vestiges of a red collar and abdominal belt. — **rosinae** *Korb* (7 f), from Armenia, resembles *scovitzii*, but the palpi and nearly the whole abdomen, especially in ♀, are bright red. *glasunovi.* Here may also belong **glasunovi**, described by Grum-Grshimailo from a single specimen which has remained beyond my reach. The individual is described as being black, without abdominal belt; a basal spot, 2 central ones and 2 distal ones on forewing, the last being large, transverse and curved, purple like the narrowly black-margined hindwing; Dchidchigrut-Darja. — The prettiest and most variegated form, in short *truchmena.* one of the finest Burnets, is **truchmena** *Eversm.* (7 g). It has a broad rosy red collar, and the abdomen is bright red, except the apex; the median pair of spots of forewing, however, is white and the basal half of *olivieri.* hindwing transparent; Turkestan. — In **olivieri** *Boisd.* (= dsidsilia *Frr.*) (7 h) not only the collar and 2—3 abdominal segments are red but also the patagia, the red spots of the forewing being very large; from Syria and Armenia. — A further series of forms has a red abdomen, like *truchmena;* here belongs *laetifica.* **laetifica** *H.-Sch.* (7 g) with the pairs of spots on forewing separate, and **hebe** (*Stgr.* i. l.) (7 h) in which they *hebe.* are slightly connected with each other by whitish bars; from Hadjin. — In **ganymedes** *H.-Sch.* (7 h), from *ganymedes.* Amasia, the penultimate pair of spots and the apical patch are rather broadly connected and the red markings of the forewing have a white edge of about 1 mm width. — The colour of the wings of the much *formosa.* smaller **formosa** *H.-Sch.* (7 i), from Asia Minor and Syria, is far lighter (pale rosy), the abdomen, however, *malatiana.* being black except a narrow belt. — In **malatiana** (*Stgr.* i. l.) (7 h) this belt is broader, comprising the 2—3 penultimate segments; Malatia, east of the Antitaurus.

Very little is known of the habits of all these species and forms, which occur partly in districts difficult of access. The early stages are mostly unknown, though the moths occur like other Zygaenae in large numbers at their flight-places. Especially of *truchmena* are we assured by Haberhauer that it inhabits the steppe of Turkestan in enormous numbers, occurring even in the gardens of the towns of that country. The larva of *scovitzii* is known, but not the food-plant; it is yellow-grey, with broad light dorsal stripe; laterally there are rows of large black spots, below which there are light dots.

escalerai. **Z. escalerai** *Pouj.* has orange spots on forewing, the external pairs being confluent; spot 6 is elongate and transverse. The hindwing is orange, with a vermilion tint, the disc being hyaline and the apex black, there being a black dot situated at centre of distal margin. The species has been discovered by Escalera in Persia, the type contained in the Paris Museum being caught in July. According to the description this form is allied to the *faxini-truchmena*-group.

hilaris. **Z. hilaris** *O.* (7 i). As small as or even smaller than *formosa*. The red colour predominates so much that it occupies the whole forewing, there remaining only small black spots, which are sometimes confluent, but are often reduced to dots standing widely separate. The red collar of the preceding and following group is never present; however, sometimes there are yellowish white hairs at the edge of the thorax. Common at the Riviera and the South-East Coast of Spain. From Digne, in the Basses Alpes, I have before me a pale yellow aberration belonging to the Tring Museum; the figure (7 i) bears the name *pallida*, however I do not consider it necessary to give here names to such pale yellow aberrations, if they *ononidis.* have not already received names. — In **ononidis** *Mill.*, from the French Riviera, the red spots are not *escorialensis.* separated by yellowish white borders from the black ground. — In **escorialensis** *Oberth.* (7 k), from the Castilian table-land, the wings are more thinly scaled, pale rosy, the black spots are reduced to thinly pale-*felix.* edged dots. — In **felix** *Oberth.* (7 k), from Algiers and South-West Spain, the black spots are more or less confluent, the red ground-colour along the distal margin being sometimes separated as a sock-like halfmoon. *faustula.* The white edges are usually altogether absent, or there are only feeble vestiges of them. — In ab. **faustula** *Stgr.-Reb.* (8 a) on the contrary the black spots are distinctly edged with yellowish white. — Lastly, ab. *mauretanica.* **mauretanica** *Stgr.* (8 a) has a red belt. — The 3 last forms fly exactly at the same time and the same places; I found them frequently united in copula. They are extremely common throughout June on nearly all the heights of the Atlas Mts., sometimes the one sometimes the other form being prevalent in *confluens.* the various flight-places. — As rare exceptional forms we have further to mention ab. **confluens** *Oberth.* (7 i) in which there are only very small black light-edged dots on the otherwise entirely red forewing; ab. *bicolor.* **bicolor** *Oberth.* (7 k) which has no black but only light dots (remnants of the edging), and lastly ab. *unicolor.* **unicolor** *Oberth.* (7 k) in which the wings are uniformly red, being narrowly bordered with black. These last 3 forms have been found in the Pyrenees among the normal form. — Larva very short and thick, yellow, anteriorly greenish, with dorso-lateral rows of thick black dots; head brown. In June on Ononis. Pupa brown, in a yellowish grey or brownish wrinkly cocoon. The moths fly especially in the morning till 11 o'clock and again in the ofternoon from 4, on dry sunny hills and on the cornfields situated between the mountains. They always whiz about quite low, about 20 cm only above the ground, resting with preference on clusters of Thyme. They vary strongly, Oberthür recording, besides the above-mentioned forms, also aberrations with coffee-brown wings.

algira. **Z. algira** *Dup.* (8 a). One of the finest Zygaenae. Fiery bright red; forewing with black distal margin, which has a bluish metallic sheen and begins and ends in a black costal spot, an anal one standing at its proximal side. In the marginal area thus bordered there is a black dot and at one-third from base a larger, mostly quadrangular spot. Body always deep black, bearing extremely rarely traces of red scaling in the place of the belt. In May in Northern Algiers. — *concolor.* ab. **concolor** *Oberth.* (8 b) has strongly reduced black spots, the wings being almost uniformly red. — *exigua.* As ab. **exigua** *nov.* (8 a) I designate the small form from higher altitudes of the Atlas, occurring from the end of June till July; it resembles the normal form in pattern, but the wings are somewhat darker and narrower and the insect is so much smaller and slenderer that the body is scarcely $^1/_3$ the size of that of *algira.* I think it probable that this form is a second brood of *algira;* however, I have no evidence for this assumption. — The specimens of *algira* fly considerably higher than the previous species, about 1—2 m above the ground, and visit especially Umbelliferae and Scabious. Their flight-places, at which they occur often in very large numbers, are very limited, being often restricted to a slope of one certain mountain. It is worthy of note that this insect is so soon worn that at the end of the time of occurrence one finds only leather-yellow or pale red, but otherwise quite perfect, specimens, which one might easily mistake for aberrations.

marcuna. **Z. marcuna** *Oberth.* (8 b) is much duller red than the previous forms, being more dark pink. The black dot situated in the distal area touches the black costal margin, and the red basal area is separated from the red discal area by a heavy black band. In the Aurès-Mts., Algiers; in May.

baetica. **Z. baetica** *Rbr.* (8 b) is similar to *marcuna,* but the dot in the distal area is isolated and the abdomen, which is always black in *marcuna,* has a red belt. South Spain. — Larva in May on Vetch.

Z. fausta. A rather small, very prettily variegated Burnet with red collar and often much red on abdomen. The 6. spot of forewing stands mostly so far separated from the 5. that it reaches spot 5 only with the extreme points of its horns (sometimes only with the lower horn). From Central Germany through South-West Europe to South Spain and Italy. — *fausta.* The name-typical **fausta** *L.* (8 b) has two white longitudinal streaks on the thorax, all the spots being strongly margined with yellowish white and the apex of the abdomen except the extreme tip bright red. South Europe to South Germany; *lugdunensis.* ab. **lugdunensis** *Mill.* is the yellow aberration of the same, from Lyon. — *nicaeae.* In **nicaeae** *Stgr.* (8 d), from the French Riviera, the spots are not or hardly perceptibly edged with light and the thoracical streaks are darkened. — *jucunda.* In **jucunda** *Meissner* (8 c), from South-West Switzerland and the Italian Riviera, the red of the abdomen is moreover wanting, or is indicated only by very sparse red scaling. — *segregata.* In ab. **segregata** *Blachier* the red spots are all separate; occurs among *jucunda* at the foot of Mt. Salève near Geneva in July and August. — *junceae.* The very bright red **junceae** *Oberth.* (8 d) has a very strong and broad collar and abdominal belt (the entire posterior half of the abdomen red except a narrow black subapical belt): but the light borders of the spots of the forewing are very thin and the yellow colour of the thoracical streaks is reduced; Pyrenees. — *faustina.* **faustina** *O.* (8 c) has a less emarginate hindwing; the red very vivid, inclusive of the belt, which is interrupted beneath. Further, the tip of abdomen is not red in ♂; the red basal spot is never connected with the central spot, and the legs are black-green instead of light yellow as in *fausta.* From Portugal. Transitions between *fausta* and *faustina,* like the specimen 8 c named "*fausta*", have often been observed. — The larva of *fausta* is light green, with brown dorsal lines and subdorsal rows of black spots; head red, abdominal legs black, anal pair red; on Coronilla. Pupa green-brown, anteriorly darker, in an ovate, white cocoon. The moths in July and August on flowery slopes, flying low.

Z. carniolica. It is hardly possible to give a general description of the colour and pattern of the 20 odd forms which are being united under this species. The antenna is strong, being enlarged to a stout club; collar and edge of thorax mostly with whitish hairs; legs black-blue, yellow beneath. Forewing metallic black-green, densely scaled, fringes light reddish yellow; 6 spots, the 6. halfmoon-shaped, parallel with the distal margin, its normal colour in exceptional specimens absent, but then always recognizable by the scaling having a different gloss. The species is distributed throughout Central and South Europe, as well as North Africa and Western Asia, extending to Turkestan and the Altai. "To enumerate all transitions and aberrations would fatigue even the most patient," says Ochsenheimer; we also shall therefore only characterize the forms which alone till now have received names.

carniolica. The name-typical form. **carniolica** *Scop.* (= onobrychis *Schiff. & Den.*, caffer *Esp.*) (8 d) has white-edged
spots on forewing and a red abdominal belt. From Central Germany southwards to the Mediterranean
flaveola. and eastwards to the Altai. — ab. **flaveola** *Esp.* (= luteola *Boisd.*) (8 d) has the hindwing and the
spots of the forewing straw-yellow instead of red. As a rarity everywhere among the normal form,
dichroma. especially often found in Austria. — ab. **dichroma** *Hirschke* has the red mixed with yellow. — In ab.
grossi. **grossi** *Hirschke* the red is replaced by coffee-brown. — **hedysari** *Hbn.* (= astragali *Hbn.*, onobrychis *Boisd.*,
hedysari. meliloti *Hbn.*, sedi *Dup.*) (8 e) has no red abdominal belt: the commonest form in Germany, but locally
diniensis. predominating also in Italy and other countries. — **diniensis** *H.-Sch.* (8 e) has a red belt; the spots of the
bohatschi. forewing very large, fiery red, with very thin light borders. French Riviera. — In **bohatschi** *Wagn.* the
jurassica. spots of the forewing are confluent in pairs; Liguria. — In ab. **jurassica** *Blachier* the central spots are
very large and connected with the red basal area by a costal streak, while the 6. spot remains isolated:
weileri. found near Geneva in July and August. — ab. **weileri** *Stgr.* (= diniensis *Oberth.*). Here the proximal spots
are merged together to a large red patch which bears single red dots, only the 6. (lunate) spot remaining
ragonoti. separate; in Germany, Austria and at the Riviera. — ab. **ragonoti** *Gianelli* (8 f), from Turin, is only a
modification of the form *weileri;* the forewing is almost entirely red, but, besides the 6. spot being isolated,
there are some more black markings in the basal area of the forewing than in *weileri.* — In the Tring
totirubra. Museum there is an aberration with entirely red wings, which may be named **totirubra** *ab. nov.* (8 f), since
the corresponding forms of other species of Zygaena have received names. Found in Hungary. — In
amoena. **amoena** *Stgr.* (8 e f), from Hungary and Lower Austria, the whitish edges of the spots of the forewing are
so enlarged that the white almost entirely displaces the dark ground-colour, the hindwing being sometimes
berolinensis. pale pink, as in the third specimen figured as *amoena* on 8 f. — In **berolinensis** *Stgr.* (8 g), occurring singly
everywhere among the normal form, but being especially typical at the Italian Riviera, the white margins
taurica. of the spots of the forewing are completely absent and the abdomen is without belt. — As **taurica** *Stgr.*
(8 g) a Lydian form is known in which the 5 proximal spots are broadly white-edged, while the 6.,
apenina. transverse, spot has almost disappeared. — In **apenina** *Tur.* (= wiskotti *Calb.*) (8 g), which flies not rarely
near Genoa behind the Campo Santo among *hedysari* and *berolinensis*, the 6. (transverse) spot is completely
cingulata. absent or is only indicated as a dull shadow in the ground-colour. — **cingulata** *Dziurz.* is a quite similar
sardoa. form without the 6. spot, but has a red abdominal belt. — **sardoa** *Mab.* is a small form from Sardinia in
graeca. which the anterior edge of the thorax has no white hairs. — **graeca** *Stgr.* resembles a small *carniolica* of
the name-typical form, and has like this insect a red belt, but the whitish yellow edges of the spots of the
orana. forewing are much thinner; from Greece. — **orana** *Dup.* (= mauretanica *Mab.*) (8 h), which closely
resembles *hilaris* ab. *mauretanica*, is easily distinguished from this by the absence of the abdominal belt
and differs from the likewise similar *hilaris felix* in the 6. (lunate) spot being isolated; from Western
barbara. Algiers. — **barbara** *H.-Sch.* (= nedroma *Oberth.*) (8 i) agrees almost exactly with *orana*, but the spots are
allardi. broadly pale-edged: North Africa. — **allardi** *Oberth.* (8 i) is *barbara* with red abdominal belt; likewise from
Algiers. — A minute dwarfed form of the preceding, from the same country, has been sent to me by
minor. Messrs. O. Staudinger & Bang-Haas as **minor** (8 i). — **amasina** *Stgr.* (8 h), from Asia Minor, closely
amasina. resembles *amoena*, but is beautifully bright-red instead of pink and has abundant traces of the black ground-colour,
wiedemanni. which in *amoena* is almost entirely replaced by white. — **wiedemanni** *Mén.* (8 h), from Anterior
Asia, on the contrary has so much white on the forewing that this is the prevalent colour: moreover, the
albarracina. abdomen is vermilion except the base and tip. — **albarracina** *Stgr.*, from Andalusia, is a small form which
transiens. approaches *orana*, but has less red on the abdomen than the previous. — In **transiens** *Stgr.* the spot 6.
which is edged with white in the previous forms, has become all white, the red centre disappearing, this form
therefore approaching the following (*occitanica*-) group, which one has several times endeavoured to distinguish
occitanica. specifically from the *carniolica*-forms; from Western Asia. — **occitanica** *Vill.* (= phacae *Hbn.*) (8 i) is here
dealt with as being only the western representative of the *carniolica*-series. The 6. spot is always pure
white; the hindwing, moreover, is broadly edged with black and the abdomen without belt: South France
and Spain. On an average somewhat smaller than *carniolica*, but by no means always so small as the
iberica. specimen figured. — In **iberica** *Stgr.* (8 i) the 6. spot is reduced to a narrow white speck, the spots 1—5
of the forewing being very thinly edged with white: the ground-colour of the forewing black; the posterior
half of the abdomen usually red: from Catalonia. — If the abdominal belt is absent, which happens
azona. sometimes in the ♂, we have ab. **azona** *Spuler.* — ab. **disjuncta** *Spuler* is based on specimens of *iberica*
disjuncta. in which the spots of the forewing are distinctly and widely separated. — Lastly, **albicans** *Stgr.* (8 k) has
albicans. the forewing almost white, with red and some black spots, the white edge of the thorax being shining
white and the abdomen posteriorly all red: from Andalusia. — There exist almost all gradations between
these forms, and by naming all of them the series of aberrations would be considerably enlarged. Especially
Oberthür figures many an interesting aberration whick perhaps recurs and might receive a name. —
Larva pale bluish green, with white longitudinal lines and yellow and black lateral dots: head and legs
brown: till June on Hedysarum, Dorycenium, Astragalus, etc. Pupa greenish brown, anteriorly darker, in a
white ovate cocoon. The moths are sluggisb, the ♀♀ having a clumsy flight on account of the thick
abdomen. They fly especially in open woods and on slopes bearing trees, and appear to be more partial

to shade than all the other Burnets. They are easy to catch and as they usually close the wings resignedly in the net, they are also more easily brought home undamaged than their congeners. The abundance in which they appear at their flight-places is often astoundingly great.

Z. cocandica *Ersch.* (7 g). A very remarkable form with yellow spots on the forewing, only the basal ones being shaded with red, the insect bearing at first glance some resemblance to the following forms. Occurs in Fergana, where it appears to be rather widely distributed and very common. Like many species of that country it has sometimes an entirely red abdomen: **karategini** *Gr.-Grsh.*, from Buchara. — As ab. **conserta** *Gr.-Grsh.*, from the Pamir, with considerably more red, the insect approaches the *fraxini*-group. *cocandica.* *karategini.* *conserta.*

26. Genus: **Epizygaena** *Jord.*

For the following insects, which extend into the Indo-Australian fauna, Jordan proposes this genus in the II. Volume of our work; they differ from the true Zygaenae especially in the hindtibia bearing only one pair of spurs instead of two pairs. Kirby had already placed some *Epizygaena*, namely *caschmirensis* and *asoka*, into the otherwise entirely African genus *Zutulba*, while Hampson dealt with them as true *Zygaena*. They deviate indeed also in colour from the *Zygaenae*, which have a very uniform pattern.

Z. afghana *Moore* (8 f). In aspect similar to the preceding forms, but the antenna very long. The spots of the forewing and the hindwing dull rosy red. In Iran: reaching farthest towards south, traversing the border of the Oriental fauna, into which it extends for a considerable distance. *afghana.*

Z. caschmirensis. Recognizable by the white tips of the antenna, the 5 pale yellow spots of the forewing and the deep purple red hindwing, which is traversed in the centre by black bands. In the name-typical **caschmirensis** *Koll.* (8 k) this black band of the hindwing is simple, being sometimes interrupted in the centre. — In **asoka** *Moore* (8 k) the band is double, the black margin being sometimes also so strongly dilated that the red ground-colour is reduced to some median spots. In this form the tips of the antenna are not distinctly white. Both forms occur in Kashmir, extending from there into India. A further form, *erythrosoma Hamps.*, is apparently restricted to the Indian fauna. *caschmirensis.* *asoka.*

Appendix.

19. Genus: **Phacusa** (p. 16):

Larva (of *crawfurdi*, Java) black, with 4 rows of brown warts, which bear brushes of white bristles. The moths remind one in aspect of Syntomids with vitreous spots.

P. djreuma *Oberth.* (3 i). Head and antennae glossy green, abdomen black, with fiery red gloss. Wings transparent, the veins, distal margins and the bases blackish. — Tse-kou, in West China. *djreuma.*

25. Genus: **Zygaena** (p. 18):

The home of *Z. gurda* is the envirous of the port of Mersina in Asia Minor, not Messina, as is stated on p. 23 in consequence of a typographical error.

Z. aurata *Blachier* is a form of *faronia* with glossy brass-yellow ground-colour: discovered in July in the Maroccan Atlas. *aurata.*

Alphabetical List

with references to the original descriptions of the Palaearctic Zygaenidae enumerated above.

* denotes that the insect is also figured in the place quoted.

achilleae Zyg. *Esp.* Eur. Schmett. II, p. 189 *.
achilleoides Zyg. *Wagn.* Soc. Ent. XIX, p. 149.
aeacus Zyg. *Esp.* Eur. Schmett. 33.
aedea Eter. *L.* Amoen. Acad. VI, p. 403.
aegerioides Art. *Wlkr.* Cat. Lep. Het. XXXI, p. 80.
aemilia Zyg. *Favre.* Mitt. Schweiz. Ent. X, p. 36.
aerea Procr. *Gr.-Grsh.* Ann. Mus. St. Pet. VII, p. 197.
afghana Epizyg. *Moore.* Cat. Lep. E. I. Mus. II. p. 286 *.
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albicans Zyg. *Stgr.* Cat. Lep. Eur. Ed. II, p. 22.
albofascia Art. *Leech.* Trans. Ent. Soc. L. 1898, p. 329.
albomacula Clelea *Leech.* Trans. Ent. Soc. L. 1898, p. 329.
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algira Zyg. *Dup.* Lep. II, p. 86 *.
allardi Zyg. *Oberth.* Et. d'Ent. III, p. 41 *.
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athamanthae Zyg. *Esp.* Eur. Schmett. 37 *.
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aurantiaca Zyg. *Hirschke.* Jahresb. Wien. Ent. V. 1903. p. 57.
aurata Zyg. *Blachier.* Ann. Soc. Ent. Fr. 1905, p. 213.
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basalis Zyg. *Selys.* Ann. Soc. Ent. Belg. 1872. p. LIX.
basiflava Herpa, *Oberth.* Et. d'Ent. XV, p. 21.
bellis Zyg. *Hbn.* Sml. Eur. Schmett. 10 *.
berolinensis Zyg. *Stgr.* Cat. Lep. Eur., p. 49.
bicolor Zyg. *Oberth.* Et. d'Ent. XX, Taf. VII, Fig. 130 *.
bieti Agal. *Oberth.* Et. d'Ent. XI, p. 29 *.
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bitorquata Zyg. *Mén.* Cat. rais., p. 259.
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capitalis Procr. *Stgr.* Hor. Ross. XIV, p. 317.
carnea Zyg. *Spul.* Schmett. Eur., p. 164.
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trimaculata Zyg. *Esp.* Eur. Schmett. Abb. II, p. 40.*
trivittata Zyg. *Tutt,* Brit. Lep. I. p. 507.
trivittata Zyg. *Speyer.* Stett. Zg. 1877, p. 41.
tristis Procr. *Brem.* Lep. Ost-Sibir., p. 97. *
tristis Zyg. *Oberth.* Ét. d'Ent. 8. p. 29.
truchmena Zyg. *Eversm.* Bull. Mosc. 1854 III, p. 184.
turatii Zyg. *Stndfss.* Mitt. Schweiz. Ent. 8, p. 368.
tutti Zyg. *Reb.* Stgr.-Reb. Cat. Pal. Lep., p. 384.

ulmivora Inope *Graes.* Berl. Entom. Zschr. 1888, p. 107.
unicolor Zyg. *Oberth.* Ét. d'Ent. 20. Taf. 7. *
uralensis Procr. *Gr.-Grsh.* Hor. Ent. Ross. 27. p. 385.

valentini Zyg. *Bruand.* Ann. Soc. Ent. Fr. 1846. p. 201. *
vanadis Zyg. *Dalm.* K. Vetensk. Akad. Handl. 1816, p. 223.
verneteusis Zyg. *Oberth.* Ét. d'Ent. 8. p. 28. *
viciae Zyg. *Hbn.* Sml. Eur. Schmett. 2. *
vitrina Zyg. *Stgr.* Berl. Ent. Zschr. 1887. p. 32.
volgensis Procr. *Möschl.* Wien. Ent. Mon. 1862, p. 139. *

wagneri Zyg. *Mill.* Bull. Soc. Ent. Fr. 1885, p. 92.
weileri Zyg. *Stgr.* Berl. Ent. Zschr. 1837, p. 39.
westwoodi Elcysma *Voll.* Tijd. Ent. 6. p. 136. *
wiedemanni Zyg. *Mén.* Mém. Acad. Imp. Pét. (6) 3, p. 50. *
wutzdorffi Zyg. *Hirschke.* Jahresb. Wien. Ent. Ver. 1905, p. 94.

yarka Pseudops. *Oberth.* Ét. d'Ent. 18. p. 42. *

zickerti Zyg. *Hoffm.* Int. Ent. Zschr. 18, p. 9.
zuleima Zyg. *Pier.* Ann. Soc. Ent. Fr. 1837, p. 22. *

Correction:

P. 21, line 15 from above should read: which are moreover much larger, being almost twice the size, with the exception of the small form *nevadensis.*

2. Family: Epicopeidae.

Some of the species of this family inhabit Indo-Malayan territory, others the east of the Palearctic Region. They are remarkable for their surprising similarity to certain species of *Aristolochia-Papilios*. Among the Palearctic species *E. mencia* and *E. hainesi*, from China und Japan, imitate respectively *Papilio mencius* and *alcinous*.

It is very difficult to find the right place in classification for this family. For, while the *Epicopeidae* show certain affinities to some families, they are widely different from them in other characters. Contrary to Hampson's opinion, the *Epicopeidae* appear to us to be better placed near the *Zygaenidae*, especially the *Chalcosiinae*, than near the *Uraniidae*, differing from the latter by the bipectinate antennae and the presence of intracellular veins. The very characteristic shape of the hindwing is proved by the venation to have nothing to do with the corresponding outline of the wing in Uranids. In this latter family the tail-like projections, where they are present, stand in connection with the radial and median veins. In the *Chalcosiinae*, on the other hand, the prolongations of the tailed forms (*Histia*, *Agalope*) are traversed by the subcostals, and this is also the case in *Epicopeia*. However, it must be borne in mind that the submedian veins of the two groups are different, the *Chalcosiinae* having two branches and the *Epicopeidae* only one.

Like the *Chalcosiinae* also the members of the present family are very tenacious of life, and when irritated emit a yellow liquid from the neck.

A very remarkable characteristic of the *Epicopeidae* is the wax-like exudation which completely covers the larva and consists either of a kind of powder, or of filaments comparable to long white hairs, *e. g.* in the Indian species *E. polydora Westw.*

The family consists of only one genus.

Genus: Epicopeia *Westw.*

Medium-sized or fairly large moths. Tongue present. Palpi small. Antennae bipectinate. Legs rather strong: anterior tibia with a spur, middle tibia with one pair of median spurs, and hind tibia with two pairs (median and apical). Subcostal of forewing five-branched, branch 1 free, 2, 3 and 4 stalked, 5 either free or stalked with first radial. Median cell traversed by a forked vein, which may however be reduced to a forked fold. Discocellular strongly angulate, sometimes also reduced to a fold. Submedian forked at the base. On the hindwing the subcostal is extraordinarily long, being sometimes more than twice the length of the costal. It is not entirely divergent from the first and second radials, but these three veins end in a strongly produced lobe, which is a real tail in the true Palearctic forms. Cell traversed by a vein, which is seldom forked, being usually simple, and is continued by two radial veins. The cell-vein may be reduced to a fold. Frenulum variable, absent from *E. polydora Westw.*, relatively well developed in *E. hainesi* according to Nagano-Kikudjiro. — Larva with 16 feet, green or blackish, but completely enveloped in a powdery, granular or fibrous wax-like substance.

E. mencia *Moore* (10 a). Abdomen black, above ringed with red in the ♂: forewing blackish grey, *mencia.* rather dark, the veins black. Hindwing of the ♂ on the whole darker; between the tail and the anal angle two rows of red submarginal spots which converge towards a rather large anal spot. In the ♀ these spots are paler and those of the inner row have a yellowish tinge. — Larva on a species of Ulmus, called small-leaved elm by the missionaries. Its black skin is concealed by a white powdery wax-like substance, which rubs off, but is soon replaced. According to E. Haldsworth the larva attains a lenght of 6 cm., and pupates in October, fastening together some leaves, which form a shelter for the chrysalis, the latter being covered with a wax-like dust. The moth appears in June. China, Fuchow (doubtless also further south), northward as far as Pekin, and from Shanghai to Hankow (and certainly as far as I-chang); Corea (Oberthür).

E. hainesi. Abdomen black above. Forewing rather paler than in *mencia*. Hindwing with only one row of red submarginal spots between the anal angle and the tail. Inhabits China and Japan in two geographical races: **hainesi** *Holl.* (= simulans *Leech*) (10 a) with a red apical spot in the hindwing. Base *hainesi.* and margin of the forewing more blackish than the broad grey median portion of the wing. This form has been carefully studied by Mori-Sotako and Nagano-Kikudjiro [1]) (August 1907), who have informed us about the life-history of the insect. According to them the species has two broods, being on the wing in April and May and again in August and September. The two broods are only distinguishable by their size, the summer form being larger than the spring one. From 20 larvae which pupated in August, 2 moths were obtained in the middle of September, the remaining 18 in the following April. The larva resembles that of *Geisha distinctissima Walk.*, and is light green, covered with a wax-like exudation which is sometimes a white powder or consists of short threads; it lives on the plant called Yamakobashi (Lindera glauca). It is short and compact in shape (about 25 mm long) and pupates in a cocoon formed *sinicaria.* of a rolled-up leaf. Japan, especially in the south (Shikoku, Gifu, Yokohama). — In **sinicaria** *Leech* the whole forewing as far as the margin is lighter and the red apical spot of the hindwing is absent (among about 40 specimens only one showed any signs of it). Central China, in the mountains above I-chang; Tai-tu-ho, Siao-lu, Mupin, Yacheu, Tien-tsuen; according to Nagano also in North Japan (Yezo).

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[1]) In Japanese, as in Hungarian, the surname is placed before the forename.

polydora. *excisa.* **E. polydora** *Westw.* This, the first-known species of the genus seems, to belong exclusively to India (Sikkim, Bhutan), but in the British Museum there is a specimen of the form **excisa** *Btlr.* (10 b), which Savage-Landor brought from Tibet. In the shape and colour of the wings it resembles *Papilio elwesi* and the ♀ of *rhetenor.* Forewing smoky grey, veins and internervular folds black, base of the hindwing grey as far as a white triangular patch which extends across 5 or 6 cellules and of which the larger portion lies proximally to a line which would unite the tips of the costal and submedian veins. Distally to this patch the hindwing is black. The hindmargin bears from the anal angle to the apex of the tail a row of red spots which form ocelli near the tail, but are reduced to crescents or simple dots near the anal angle.

caroli. **E. caroli** *spec. (?) nov.* In Sikkim and Bhutan a number of *Epicopeia* occur which have been described by Moore and Butler under various names (cf. vol. 10 of Macrolepidoptera, p. 60, plate 9) and which are obviously closely allied to *philenora Westw.* Our ignorance of the early stages prevents us from deciding whether *polydora* and *philenora* are distinct or only forms of the same species. *caroli*, of which I have one specimen from Tseu-ku before me from the collection of M. Charles Oberthür, is quite evidently intermediate between *polydora excisa Btlr.* and *philenora caudata Btlr.*; if *philenora* and *polydora* are distinct species, the new form is also distinct, and I therefore name it *caroli.* Ground-colour of the forewing smoky grey, the hindwing with blue metallic reflections, recalling the ♂ of *Papilio protenor.* But the characteristic sinus between the costal and subcostal gives the insect the appearance of a tailed *Papilio.* The hindwing bears an almost triangular patch, as in *excisa*, which extends over 4 cellules; the hindmargin of the hindwing is accompanied by pale red ocelli. In short, the moth has the shape and colouring of *philenora* and the markings of *polydora.* The forewing bears at about $^3/_4$ of the cell a red costal spot. Body black, head and end of abdomen red.

Alphabetical List

of the Palearctic forms of *Epicopeidae* with a reference to the original descriptions.

* denotes that the form is also figured in the place quoted.

caroli Epic. *Janet*, Seitz, Macrolep. 2, p. 36. *
excisa Epic. *Butl.* Ill. Lep. Het. B. M. 5, p. 46. *
hainesi Epic. *Holl.* Trans. Amer. Ent. Soc. 16, p. 72.
mencia Epic. *Moore*, Proc. Zool. Soc. Lond. 1874, p. 578.*
sinicaria Epic. *Leech*, Ann. Mag. N. H. 19 (1897), p. 181.

3. Family: **Syntomidae.**

Nearly always small moths, which very rarely attain nearly medium size, and have a rather stout body, lanceolate forewing and very small hindwing, which sometimes appears to be a mere appendage to the forewing. Head small, with convex and comparatively very broad frons, and semiglobular eyes set far apart. Antennae usually setiform, but occasionally pectinated, or in the wasp-like forms as thick as the antennae of wasps. Tongue nearly always strongly developed, but sometimes aborted. Palpi very short. Legs strong, the hindlegs especially often conspicuously modified in appearance by tufts of hair, brushes, vivid marking and colouring. Tibiae with short spurs. Forewing rather narrow with the apex slightly rounded and sometimes somewhat widened. The cell more than half the length of the forewing, mostly very narrow at the base and broad and truncate at the apex. The submedian forked at the base. Where the hindwing is strongly reduced, the venation is much simplified; cell small; frenulum present. Abdomen often very stout in the females, so that these cannot fly if the wings are shortened at the same time. The abdomen is frequently ringed and spotted with yellow and metallic colours. — Larva quite unlike those of the preceding group, bearing crests of hair and often brushes and long tufts. The hairs are generally placed on rows of short warts on the back, while anteriorly and posteriorly long tufts of hair are directed foreward and backward respectively. Very often the larvae have extremely vivid colouring, being snowy white, bright red, etc. Pupa usually short and stumpy, the segmental incisions very deep, otherwise without special characteristic. It lies in a round, egg-shaped, tough cocoon, which sometimes resembles a small bird's-egg.

Nearly all the Syntomids are diurnal, often marked with bright metallic colours, and show a golden gloss when on the wing. They nearly all frequent flowers, and are so fearless when sucking that one can take them with the fingers. When disturbed they go off with a straight, whizzing flight, similar to that of *Zygaena*, and settle in the grass or bushes, some on the underside of leaves. Many of these moths closely resemble other insects, especially aculeate Hymenoptera and mimic their movements and mode of flight. In several tropical species (*Trichura*) even the sting of an Hymenopteron is mimicked by a peculiar hairy process at the apex of the abdomen. Those insects which most closely resemble wasps have a peculiar waist-like constriction, the perfectly egg-shaped abdomen being connected with the thorax by a thin stalk. The colouring of these mimetic species is like that of the model. In the Old World where the poisonous wasps belong to the genera Vespa, Eumenes, Pollistes and Odynerus, and often have yellow-ringed bodies, many Syntomids are also ringed with black and yellow; while in tropical America, where the best-armed Hymenoptera, belonging to the Pompilid genus Pepsis, are blue in colour, the Syntomids are often also uniformly blue-black. In fact, one may say that there is no very poisonous genus of Hymenoptera with an abundance of species which is not imitated by some Syntomid. These moths are very tenacious of life, and like the Zygaenas it is difficult to kill them by a squeeze. However, the resemblance of the two families is only superficial, being caused by similarity in the shape of the wings and body, and not by any real relationship, as has already been mentioned on page 4 of the present volume. On closer observation many external differences will be noticed; for instance, when the Syntomids are resting, the wings are as a rule more spread out, while in the *Zygaenae* they are laid close along the body; an exception form only those genera of Syntomids which mimic Ichneumonids and therefore have the wings folded close over the body so as not to betray themselves, e. g. the South American genus *Trichura* already mentioned above.

The Syntomids are distributed all over the warm and temperate zones of the earth, but are common only in the tropics and subtropics. In the temperate region of America the number of species, which can be counted by the hundred in Central America, dwindles quickly down to 20, and there are only 4 European species as compared with the very large number in tropical Asia. While numerous Syntomids, often with a beautiful burnished gold colouring, inhabit tropical Africa, only one small form is known to occur in Africa north of the Sahara.

Most Syntomids, like the Zygaenids, appear in large numbers of individuals. The largest German form, *Synt. phegea*, may be observed flying up and down on sunny slopes in great abundance. In China Umbellifers resembling hemlock and growing along the trenches are sometimes literally covered with the yellow-ringed species of *Syntomis*, so that one can simply pick them off with the killing-bottle. In Brazil I caught over 20 different species in one hour on a patch only a few yards square overgrown with a kind of Spiraea, and in Ceylon I once found such a multitude of *Syntomis passalis*, which is easily mistaken for a wasp when on the wing, that I thought I had happened on a wasp's nest.

About 1200 forms of Syntomids are known, which Hampson classifies in about 150 genera in his recent monograph, the genus *Syntomis* alone containing 150 forms. In the Palearctic region occur only 3 genera, apart from the 50 mostly Asiatic forms of the genus *Syntomis*.

1. Genus: **Syntomis** *O.*

Small moths, varying greatly in size and shape, from rather stoutly built insects to slender, midget-like species. Head inclusive of eyes transversely oval, with broad, often bright golden-yellow or white frons; palpi very small, so that they often do not entirely cover the strongly developed tongue. Antennae more than half the length of the costa, filiform, generally with white tip. Thorax in the wasp-like species spotted with yellow on the shoulders, sides of breast, tegulae and the metathorax, etc. Legs very strongly developed, the hindtibiae sometimes slightly dilated, so that they resemble the pendant hindlegs of wasps on the wing. Abdomen either with a yellow base and a yellow belt or entirely ringed with yellow, the latter being the case especially in East Asiatic and Indian species. On account of this yellow marking the Syntomids are so like certain Eumenids and Pollistes that one can hardly distinguish them when they are on the wing. This similarity is enhanced by the fact that the Syntomids frequent the same flowers (white Umbellifers) on which the wasps are to be found in great numbers. If a *Syntomis* of the *germanus*-group is disturbed, it spreads the wings without flying away and moves forward in jerks, in the same manner as true wasps. This peculiar movement and the position of the wings renders the imitation perfect, just as many of our Sesias, which mimic the Ichneumonids in facies, still more simulate their models by pendulating like the Ichneumonids before the leaf on which they intend to settle.

As far as I know, only the eggs of the European species are known; they are round, yellow, small, and are deposited in clusters. Larva dark grey, densely covered with brown woolly tufts united to form cushions. Pupa brown, in a loose cocoon intermixed with the hairs of the larva. The moths are on the wing in the summer, are diurnal, flying in sunshine, and the ♀♀ are often very sluggish and clumsy. English authors often employ the name *Zygaena* for this genus, while the red burnets which we call *Zygaena* are designated with the generic name *Anthrocera*.

phegea. **S. phegea** *L.* (= quercus *F.*) (9 a). Blue-black, forewing with 6, hindwing with 2 white spots.
Abdomen with a yellow ring each on segments 1 and 5. Very widely distributed over Europe
and Anterior Asia, but local, being absent from large districts, for instance the North and North-West,
ganssuensis. in the South and South-East on the contrary often abundant. — The Central Asiatic form **ganssuensis**
Gr.-Grsh., from Kuku-Nor, which is not known to me, is said to have one orange-coloured band on the
pfluemeri. abdomen; the forewing bears 6, the hindwing 2 spots, as in true *phegea*. — **pfluemeri** *Wacq.* (9 a) is a
form bearing 5 dots, which occurs here and there among ordinary specimens in the North, but is the
usual form in the South, for instance at the Riviera, although specimens with 6 spots (*sexmaculata Gian.*)
are also found there. — In the same way, in the Caucasus one regularly meets with specimens whose an-
nigricornis. tennae are entirely black without white tips; this is **nigricornis** *Alph.* — The dots themselves may be
kruegeri. enlarged and partially confluent, e. g. in ab. **kruegeri** *Ragusa* (9 a), which Krüger found in Sicily. —
phegeus. On the other hand, specimens with reduced spots are not rare, for instance ab. **phegeus** *Esp.* (9 b), where
the spots are smaller and some entirely obsolete, so that the forewing bears only 4 and the hindwing one
cloelia. small dot. In ab. **cloelia** *Bkh.* (9 b) there is only one spot on the forewing and none at all on the hind-
cyclopaea. wing. Ab. **cyclopaea** *Ragusa*, found in Sicily, bears no spots at all on the forewing and only one distinct
iphimedia. one on the hindwing. And in **iphimedia** *Esp.* (9 b) all spots are obsolete. — These aberrant specimens
occur among true *phegea*, and are common one year and rarer the next; but on the whole they are found
more frequently in the south of the region, for instance at the Riviera, in Italy, and Sicily. — The yellow
eggs are deposited in clusters on blades of grass. The larvae hibernate and feed on grass or low-growing
plants; they are covered with brown woolly tufts on a black ground, and are full-grown in June. The
moths are on the wing in June and July on sunny slopes and in dry woods. The ♀♀ have a very stout,
heavy body and comparatively short wings; they remain in the grass, awaiting the ♂♂.

bicincta. **S. bicincta** *Koll.* (9 b). Similar to the preceding, but of a more slender build, the spots larger than in large-spotted *phegea*, and at once distinguished from the latter by the sulphur-yellow forehead. In Kashmir, on the northern slopes of the Himalaya, and in the valleys of its eastern ranges, in the Yangtse valley, and southward far into India (Calcutta).

mestralii. **S. mestralii** *Bugn.* (= kindermanni *Led.*) (9 c). Body and forewing similar to those of *phegea*, but
the antenna entirely black with the exception of the extreme tip, spots larger, especially that below the
cell of the forewing more rhombiform than elongate-oval, and the large spot on the hindwing occupies the
whole basal area with the exception of the base itself. The wings of the ♀ are reduced to small, pointed
lobes, but still bear distinct white markings, although the spots are reduced to minute dots on the fore-
palestinae. wing; from Syria. — In the form **palestinae** *Hamps.* the antenna is usually entirely black and the spots
libanotica. more yellowish; from Palestine. — **libanotica** *Bang.-H.*, a much smaller form from the Lebanon, measuring
only 28 to 30 mm. expanse, but otherwise closely resembling *mestralii*, the antenna having usually a white
tip, but being occasionally without it. Caught at an altitude of 800 m., near the village of Delepta.

antiochena. **S. antiochena** *Led.* (9 d), from Syria, closely resembles *mestralii*, the ♀, like that of the latter, having only small lobes instead of wings, these being still more reduced than in *mestralii*. The species is recognisable by the white spots on the forewing being generally much smaller; the large spot on the hindwing is also reduced in size, and its margins are irregular. The tip of the antenna generally white, but sometimes black, this being the case in ab. **taurica** *Hamps.*, where the spots are also still more reduced. Syria. *taurica.*

bactriana. **S. bactriana** *Ersch.* (9 c). Very similar to the two preceding species, especially *mestralii,* but easily recognised by the large, somewhat rounded, slightly yellowish spot on the hindwing which is situated exactly before the anal angle and far distant from the apex of the wing. The wings of the ♀ are fully developed. From Turkestan.

maracandina. **S. maracandina** *Ersch.* (9 c). Resembles *bactriana,* the wings of the ♀ being also fully developed, but the wings have a strong metallic sheen with a slight violet tinge, all white spots smaller, that below the cell often comma-shaped, the spot on the hindwing small, round, and close to the base. Specimens with especially small spots are designated ab. **cocandina** *Ersch.* Turkestan. *cocandina.*

caspia. **S. caspia** *Standf.* (9 d). Very similar to the preceding species, and probably only a form of it. Forewing almost exactly as in *maracandina,* only the white spot below the cell is generally larger than the others, and pear-shaped. The spot on the hindwing is also large, being square with rounded corners; it is situated so close to the anal margin that the latter is reduced to a black line. Southern Russia and Armenia and the neighbouring Turkestan.

sintenisi. **S. sintenisi** *Stgr.* (9 d). Much smaller than the preceding species, all spots bright yellow on a background with a strong blue gloss. The hindwing may bear smaller or larger transparent yellowish spots. Central and Eastern Asia, as far as North China.

fortunei. **S. fortunei** *Orza* (9 d). All spots of the forewing large, oval in basi-distal direction. The hindwing entirely yellowish hyaline, only the apex and distal margin blue-black, the marginal band being produced into a tooth directed basad. Japan. The ♂♂ very common in August; the ♀♀, which are sluggish and much smaller, rarer. — In specimens from Hokkaido the two spots situated below the cell of the forewing sometimes merge together to form a long streak. In ab. **erebina** *Butlr.*, on the other hand, the spots are reduced. *erebina.*

cingulata. **S. cingulata** *Weber* (= anetta *Butlr.*) (9 d). Smaller, rather duller black-brown, without distinct metallic gloss, the spots on the forewing very elongated, only the one near the base very small. On the hindwing the hyaline spot occupies the whole anal half. Central and Eastern China, extending in South China onto indo-Australian territory.

cyssea. **S. cyssea** *Stoll* (= collaris *F.*, schoenherri *Bdv.*, caprea *Prittw.*) (9 e). Similar to the preceding, darker, with a stronger metallic gloss, frons and a thin collar (not visible on the plate) as well as the first and fifth abdominal segments bright yellow. Spots on the forewing much smaller than in the preceding, the two spots on the hindwing far apart, the anal one being generally larger. Kashmir, but also distributed over the whole of Anterior India, as far as Ceylon, occurring there in large-spotted forms, e. g. *cysseoides Btlr.* On high-roads, especially on the winding roads leading up the mountains, singly, but not rare.

persica. **S. persica** *Koll.* (9 f). Abdomen with several orange-yellow bands, thorax black. Forewing with large, longitudinal hyaline spots, hindwing quite glassy, with narrow black margin. Persia.

dichotoma. **S. dichotoma** *Leech* (9 e). One of the largest and finest *Syntomis* of this region. Abdomen with 4 bright yellow rings; the first behind the thorax broad, the second and third narrow, and the fourth on the fifth segment broad. The hyaline spots on the forewing are often confluent, but in typical specimens the two glassy spots below the cell of the forewing are separated by a black bar, which goes from the middle of the cell to the middle of the inner margin. In ab. **concurrens** *Leech* this bar is absent, so that the forewing presents an almost uniformly hyaline surface. In Western China and Tibet. *concurrens.*

formosae. **S. formosae** *Butlr.* (= emma *Butlr.*) (9 e). Size and wing-markings almost as in *fortunei,* only the ground-colour darker; but at once recognisable by the yellow-spotted thorax, and by all the segments of the abdomen bearing yellow rings. In Central China (Fu-chow), also in Southern China, Formosa and parts of India. Seems to be rare on Palearctic territory.

perixanthia. **S. perixanthia** *Hamps.* (9 f). Very similar to *dichotoma,* but the thorax strongly spotted with light yellow, and the abdomen having 7 pale yellow rings instead of 4 orange-yellow ones, these rings being partially slightly interrupted by a dark dorsal line. In Western China, also in Formosa. — The form **persimilis** *Leech* is distinguished from true *perixanthia* by the black instead of yellow tegulae. From Ni-tu. *persimilis.*

masoni. **S. masoni** *Moore* (= davidi *Pouj.*). This species stands in the same relation to *perixanthia* as *concurrens* to *dichotoma*; the marking of the body consisting of conspicuous yellow rings and spots is almost the same. But the wings present an almost uniformly hyaline surface, owing to the absence of the black bars. Western China, Tibet; also in Further India.

consequa. **S. consequa** *Leech* (9 e). Much smaller than the preceding species, the abdomen likewise bearing 6 light yellow belts, which are, however, quite thin, and the thorax entirely black with the exception of the yellow tegulae. The glassy spots large, but divided into two groups by dark bars, one of these groups lying in the basal, the other in the marginal portions of the wing. Hindwing with a longitudinal glassy spot in the anal area. Western China and Tibet.

muirheadi. *aucta.* **S. muirheadi** *Fldr.* (9 g). Head, thorax and abdomen with bright orange-yellow markings. In the ♀ the abdomen bears 7 fairly regular orange rings, in the ♂ these are rather unequal, and those on the 2nd and 4th segments constricted or interrupted dorsally. The markings of the wings also vary considerably, but this is not always sexual, as Felder supposes. The specimen figured is an exceptionally black one. The hyaline spots may merge together to form large transparent areas, which almost cover the whole surface of the wing as in *dichotoma concurrens*. Leech has distinguished as ab. **aucta** specimens in which the vitreous spot in the cell occupies the whole area of the latter, and the elongate transparent spot below the cell is much enlarged. Eastern and Southern China.

euryzona. **S. euryzona** *Leech* (9 g). Body spotted and tinged with orange yellow as in *muirheadi*; on the forewing all the hyaline spots confluent so as to form one large, transparent area, which only leaves a dull dark-brown margin and a dark spot at the apex of the cell. In Western China and Tibet.

germana. *mandarinia.* In **S. germana** *Fldr.* (= thelebus *Mén.* nec *F.*, fenestrata *H.-Schäff.* nec *Drury*) the thorax is very strongly marked with orange-yellow, and the abdomen ringed with the same colour; the hyaline spots are large but sharply separated; the largest are the one below the apex of the cell and that on the hindwing, which occupies the greater part of the wing. Amurland and North China. — The form **mandarinia** *Butlr.* (9 h) has the markings of the body more extended yellow and the hyaline spots are more sharply defined; but this form can hardly be distinguished from true *germana* on account of the great variability of the specimens even in one locality. On the Yang-tse-kiang and in Japan. The moths are very common locally, frequenting especially the white Umbellifers which overgrow the ditches; in June and July. Probably *polymita Sparrm.* (= thelebus *F.*), from South China, is only a southern representative of this East Asiatic species.

pasca. **S. pasca** *Leech* (9 h). Frons yellow, thorax with fewer markings than even in the darkest *germana*, the spots more reduced, the ground-colour being deeper black and more extended. Central and Western China and Tibet.

torquata. **S. torquata** *Leech.* In this species the tegulae are yellow, but the frons black; abdomen bearing 7 yellow rings; forewing with 6 hyaline spots; the fringe below the apex yellowish. Central China.

acrospila. **S. acrospila** *Fldr.* (9 h). Similar to the preceding, but at once distinguished by a small, yellowish white spot in the apex of the forewing. In East, Central and West China.

diaphana. **S. diaphana** *Koll.* (= vitreata *H.-Schäff.*, oenone *Butlr.*). This large and easily recognised species only touches the Palearctic region in Kashmir, and seems not to occur at all in Eastern Asia, while it is widely distributed in tropical India (Burmah, Assam, etc.). Head and thorax black and yellow, abdomen bearing 7 yellow rings in the ♂ and 6 in the ♀, the anterior ones of these being constricted or interrupted dorsally. On the forewing only a spot at the apex of the cell and the margin are black, the latter being proximally widened into rays, and on the hindwing only the margin; everything else hyaline, yellowish. Seems to occur rather singly.

rubrozonata. *leucoma.* **S. rubrozonata** *Pouj.* Frons and tip of antenna white, thorax black, abdomen with 7 purple-red or orange-yellow rings, = ab. **leucoma** *Leech* (9 f). Margins and cellular spot of the forewing black. From the margin a long black ray extends to the apex of the cell, and another broader one between the median branches also towards the cell. Tibet and Western China.

graduata. **S. graduata** *Hamps.* (9 f). Also ringed with red, and distinguished by the cells of both wings being black, there being only one hyaline stripe below the cell, and on the forewing also one beyond it, but no spot in the cell. Kiang-Nan, China.

swinhoei. *S. actea Swinh.* The typical form of this Indian species has not yet been found on Palearctic territory, but only a variety of it. The form **swinhoei** *Leech* has a black head and frons, thorax spotted with orange. Abdomen with 7 orange rings. Forewing with a yellow stripe below the costa and above the inner margin, cell with a wedge-shaped hyaline spot, the other hyaline spots as in other species. In Western China.

pratti. **S. pratti** *Leech.* From Central China: in this species the frons is spotted with white, and two-thirds of the antenna are white; thorax black, with orange spots on the tegulae. Abdomen with 6 orange rings and black apex. Wings with hyaline spots as in other species.

xanthoma. **S. xanthoma** *Leech* (9 g). The yellow spots on the thorax small and dull, pale yellow, and abdomen with 7 very narrow yellow bands, the wings black-brown with a purple gloss; the hyaline spots not larger than in *phegea*, dull in colour. Central China.

2. Genus: **Ceryx** *Wallgr.*

Closely allied to the preceding genus, but consisting mostly of smaller, slenderer insects, the only Palearctic species being one of the most robust. Distinguished from *Syntomis* by the greater reduction of the venation of the hindwing, the upper median being also absent. The hindwings therefore have still more the appearance of being unimportant appendages to the comparatively broad forewings. On the wing *Ceryx* consequently somewhat resembles *Diptera*, and this similarity is increased by the fact that the movement during flight is undulating and dancing. In HAMPSON's classification the genus contains 39 species, some of them minute, and is distributed over India, especially the Malayan and Papuan Archipelagos, as well as Northern Australia and Ethiopian Africa. Only one species, which is distributed over India and South China, extends into the Palearctic region in Kashmir. It is worth noticing that already FABRICIUS called a species of this genus „*Zygaena diptera*" evidently considering the reduction of the hindwings as the most important charcteristic of the insect. Nothing is known about the early stages. The moths often vary greatly in one locality. They generally fly about 2 m. above the ground, on sunny roads and open places in the woods. While the species of *Syntomis* are numerous on Umbellifers, I never saw a *Ceryx* sucking at a flower; but their strongly developed proboscis proves that this occurs; perhaps they more often frequent the blossoms of trees and shrubs than of herbs. Not one of the numerous specimens which I studied in Nature was abundant.

imaon. **C. imaon** *Cr.* (= fusiformis *Walk.*, approximata *Walk.*) (9 h). Very similar to *Syntomis phegea*, and with the same yellow band on the 1st and 5th segments, but smaller and slenderer, the spots hyaline, not white, and much larger than in *phegea*, or the likewise similar *S. fortunei*. The hyaline spots moreover vary in size and shape; they may be partially reduced — **sargania** *Butlr.* — or may occupy the greater portion of the hindwing — **artina** *Butlr.* — or may nearly disappear altogether — **mota** *Swinh.* *sargania. artina. mota.*

3. Genus: **Callitomis** *Butlr.*

This genus consists of half a dozen rather different Syntomids, which are distinguished from other Syntomidae by a covering of short hairs on the surface of the wings. In contrast with the preceding genus the hindwings are more rounded, and are larger in the Palearctic forms in proportion to the forewings. North India and Java, a less closely allied species in Celebes.

leucosoma. **C. leucosoma** *Butlr.* (9 h). Abdomen ringed with yellow, wings dull dark brown, with light spots. Kashmir.

syntomoides. **C. syntomoides** *Butlr.* Similar, generally darker, hindwing with a smaller spot at the base; abdomen not ringed with yellow, but with only two yellow belts on segments 1 and 5, so that there is a slight resemblance to *Syntomis phegea*. Also in Kashmir.

4. Genus: **Dysauxes** *Hbn.*

This genus contains some rather small moths with orange-yellow abdomen, along the back of which there is a row of small black dots. Head very small, strongly resembling that of Lithosids in shape; tongue strongly developed, palpi porrect, but short; antennae finely ciliate, these ciliae being short in true *Dysauxes*. Forewings dark brown, nearly always with some small whitish hyaline spots; hindwings generally orange like the abdomen, and edged with a dark colour. If we adopt the genus as conceived by HAMPSON, the species only occur in Europe, Anterior Asia, Mauretania, Madagascar, and the Mauritius. But in Madagascar a large number of similar Syntomids occur, all having brown forewings with whitish spots, and orange hindwings with dark margins, which are closely allied in spite of small differences in the antennae and venation (*Micronaclia*, *Stictonaclia*, *Thyrosticta*), and other very similar forms occur in Ethiopian Africa, many of which have the colouring of *Dysauxes*, but reach the size of *Callimorpha dominula*. The larvae are blackish grey with light warts, thin tufts of hair and light dorsal stripe; they live on lichens in the summer, and can run exceedingly fast. The pupae in a loose cocoon. The moths are on the wing in the hot sunshine on waste fields and on slopes, and are fond of spots overgrown with broom and heather.

punctata. **D. punctata** *F.* (= famula *Godt.*, serva *Hbn.*, confamula *Hbn.*, ancilla var. *Esp.*) (9 i). Forewing dark brown, two white spots on the disc and three before the apex, the upper one standing alone. Hindwing orange, margin dark brown. Southern Europe, northward as far as Burgundy, Alsace, Vallais, Southern Tyrol, Hungary, to the Ural Mts., Asia Minor, Armenia and Turan. — In **hyalina** *Frr.* (9 i). *hyalina.*

ragusaria. from South-East Europe and Asia Minor, the hindwing is hyaline in the costal region; ab. **ragusaria,** which Zickert bred at Naples together with normal *famula* and *servula*, resembles *hyalina* in the almost
famula. entirely hyaline hindwing, but the spots on the forewing are absent. — In **famula** *Frr.*, from Dalmatia, the Balkan Peninsula, and Asia Minor, the hindwing is paler and also hyaline in the costal region. The
parvigutta. spots on the forewing, however, are small and incomplete. — In **parvigutta** *Christ.* (9 i), from Turkestan,
modesta. all spots on the forewing are reduced to minute, sometimes almost invisible dots. — In **modesta** *Krul.*, from South Russia, the spots on the forewing are of normal dimensions, but with a yellow tinge instead
servula. of ivory. — **servula** *Berce*, from South Italy, France and Spain, has no spots on the forewing; — and in
separata. the Mauretanian form **separata** *Bang-H.* (9 i), from Western Algeria, which I, however, also found in the Aurès Mts., the orange-colour on the hindwing is, moreover, reduced to a basal spot by the widening of the dark margin. — Larva rather unicolourous, more densely hairy, with the warts but slightly paler, on lichens on trees until June. The moths are common in South Europe; they fly in June and July on very hot slopes, and when on the wing resemble a small sawfly of the genus *Nematus*.

ancilla. **D. ancilla** *L.* (= obscura *F.*, quadrioculata *Goeze*, lemopicta *Fourcr.*, tripunctata *Scop.*) (9 i). Much larger, the brown forewing has only two larger spots and one small isolated dot before the apex, no discal spots; the hindwing is brown in the ♂ and a little transparent discally, in the ♀ spotted with yellow on the disc. Central, Eastern and Southern Europe, from Belgium and France to the Ural Mts. and Turkey, from Pomerania to Naples and Southern France. Larva blackish with light warts, broad yellow dorsal stripe and pale lateral one, hairs not very dense, but fairly long and in tufts, until June, on lichens (Lichen, Jungermannia). Pupa reddish brown, in a loose cocoon. The moths fly singly on shady paths, at the edge of shrubs, and in hollow roads, and are very common on the Mediterranean coasts, but often very rare in the northern districts of their area.

syntomida. **D. syntomida** *Stgr.* (9 h). Fore and hindwing yellowish hyaline except for the dark distal margin, basal area, abdomen and tegulae orange. Forewing with dark brown cellular spot. From Mardin in Mesopotamia.

Alphabetical List

of the Palearctic *Syntomidae* with a reference to the original descriptions.

* signifies that the form is also figured in the place quoted.

acrospila Synt. *Fldr.* Novara Lep. *
ancilla Dys. *L.* Syst. Nat. (12), p. 835.
antiochena Synt. *Led.* Wien. Ent. Mon. 5, p. 151. *
artina Cer. *Bull.* Journ. Linn. Soc. Zool. 12, p. 347.
aucta Synt. *Leech*, Entomolog. 31, p. 153.

bactriana Synt. *Ersch.* Fedtsch. Reise Lep., p. 29. *
bicincta Synt. *Koll.* Hüg. Kaschmir 4, p. 460. *

caspia Synt. *Stgr.* Stett. Ztg. 1877, p. 176.
cingulata Synt. *Weber*, Obs. Entom., p. 109.
cloelia Synt. *Esp.* Eur. Schmett. Abb. 11, p. 46. *
cocandina Synt. *Ersch.* Fedtsch. Reise Lep., p. 31.
concurrens Synt. *Leech*, Entomolog. 31, p. 153.
consequa Synt. *Leech*, Entomolog. 31, p. 153.
cyclopea Synt. *Ragusa*, Natur. Sicil. 17, p. 20. *
cyssea Synt. *Stoll*, Pap. Exot. 4. *

diaphana Synt. *Koll.* Hüg. Kaschmir 4, p. 460. *
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erebina Synt. *Bull.* Trans. Ent. Soc. Lond. 1881, p. 5.
euryzona Synt. *Leech*, Entomolog. 32, p. 153

famula Dys. *Frr.* Neu. Beytr. 2, p. 143. *
formosae Synt. *Bull.* Journ. Linn. Soc. Zool. 12, p. 346.
fortunei Synt. *Orza*, Lép. Jap., p. 38.

ganssuensis Synt. *Gr.-Grsh.* Hor. Ent. Ross. 25, p. 161.
germana Synt. *Fldr.* Wien. Ent. Mon. 6, p. 37.
graduata Synt. *Hamps.* Cat. Lep. Phal. I, p. 67. *

hyalina Dys. *Frr.* Neu. Beytr. 5, p. 152. *

imaon Cer. *Cr.* Pap. Exot. III, p. 94. *
iphimedia Synt. *Esp.* Eur. Schmett. Abb. 11, p. 49. *

kruegeri Synt. *Ragusa*, Natur. Sicil. 17, p. 20. *

leucoma Synt. *Leech*, Entomolog. 31, p. 154.
leucosoma Call. *Bull.* Journ. Linn. Soc. Zool. 12, p. 351.
libanotica Synt. *Bang-H.* Iris 19, p. 142.

mandarinia Synt. *Bull.* Journ. Linn. Soc. Zool. 12, p. 349.
maracandina Synt. *Ersch.* Fedtsch. Reise Lep., p. 30. *
masoni Synt. *Moore*, Proc. Zool. Soc. Lond. 1878, p. 845.*
mestralii Synt. *Bugn.* Ann. Soc. Ent. Fr. 1837, p. 439. *
modesta Dys. *Krul.* Soc. Ent. 9, p. 161.
mota Cer. *Swinh.* Trans. Ent. Soc. Lond. 1891, p. 134.
muirheadi Synt. *Fldr.* Wien. Ent. Mon. 6, p. 37.

nigricornis Synt. *Alph.* Rev. Ent. I, p. 18.

palestinae Synt. *Hamps.* Cat. Lep. Phal. 1, p. 110.
parvigutta Dys. *Christ.* Verh. Ver. Brünn 27, p. 11.
pascа Synt. *Leech*, Trans. Ent. Soc. Lond. 1889, p. 124. *
perixantha Synt. *Hamps.* Cat. Lep. Phal. I, p. 97. *
persica Synt. *Koll.* Denkschr. Akad. Wiss. Wien, M. N. Cl. 1, p. 53.
persimilis Synt. *Leech*, Entomolog. 31, p. 152.
pfluemeri Synt. *Wacq.* Stett. Ztg. 1876, p. 370.
phegea Synt. *L.* Syst. Nat. I, p. 491.
phegeus Synt. *Esp.* Eur. Schmett. Abb. II, p. 46.
pratti Synt. *Leech*, Trans. Ent. Soc. Lond. 1889, p. 123. *
punctata Dys. *F.* Spec. Ins. 2, p. 207.

ragusaria Dys. *Zickert*, Natur. Sicil. 17, p. 97.
rubrozonata Synt. *Pouj.* Bull. Soc. Ent. Fr. 1886, p. CXVII.

sargania Cer. *Bull.* Trans. Ent. Soc. Lond. 1879, p. 4.
separata Dys. *Bang-H.* Iris 19, p. 143. *
servula Dys. *Berce*, Ann. Soc. Ent. Fr. 1862, p. 386. *
sintenisi Synt. *Standfss.* Rom. Mém. Lép. 6, p. 664. *
swinhoei Synt. *Leech*, Entomolog. 31, p. 152.
syntomoïdes Call. *Bull.* Journ. Linn. Soc. Zool. 12, p. 351.
syntomida Dys. *Stgr.* Iris 4, p. 248.

taurica Synt. *Hamps.* Cat. Lep. Phal. I, p. 109.
torquata Synt. *Leech*, Trans. Ent. Soc. Lond. 1889, p. 124.

xanthoma Syst. *Leech*, Entomolog. 31, p. 152.

4. Family: **Arctiidae, Tigermoths.**

With this family we commence that division of the Heterocera which were formerly classified as true Bombyces. The Tigermoths form a link between the so-called Micro- and Macrolepidoptera, in as much as their first and certainly eldest groups, the Lithosiinae and Nolinae, show an unmistakable affinity to the Micro-Lepidoptera, while those genera which consist of the larger and often beautifully coloured Arctiinae seem to be allied to the Noctuids and especially the Acronyctas.

One can hardly give a general diagnosis for the entire family, which consists of over 400 genera and more than 3000 species. The venation, which is usually so constant, often varies so much in the Arctiids that even in one specimen one side is different from the other. The group takes its German name „Bärenspinner“ from the dense and sometimes pelty hair of the larvae, which pupate in a cocoon. The larvae of the elder groups, those which are more closely allied to the Micro-Lepidoptera, live on lichens, those of the other groups are generally polyphagous, and are extraordinarily greedy, often growing very rapidly. On the other hand, we also find species among the Arctiids whose larvae hibernate more than once on account of their slow growth.

The hairs of Arctiids are generally not very poisonous. They sting a little mechanically, and in some tropical species are modified into needle-like bristles. But as regards the inflammation they cause, they do not nearly come up to those of other Bombyces, like Lasiocampids, certain Saturnids (*Hyperchiria*) and Limacodids. Many of these larvae are able to travel long distances, and all the larvae of Arctiids may be described as agile on the whole, a characteristic which is also apparent in the moth, whereas the pupa is often absolutely incapable of motion, and cannot even make the usual movements of the abdomen.

The moths themselves are on the whole of a regular shape, which is characteristic of each subgroup. Except in *Argina* we nowhere find tail-like prolongations of the wings; but there are often thin tufts of hair or discs with raised scales on the wings; and occasionally there are knot-like swellings at certain points on the wings; etc.

Nowhere do we meet with mimetic resemblance. Only the very smallest species are sometimes adapted to their surroundings; the larger forms are quite conspicuous in shape and colouring, and fly fearlessly in day-time, though they may normally be night-fliers. They are protected by the very sharp and aromatic oil which exudes from two openings in the thorax behind the collar when irritated, and which in its effect on the tongue resembles that of the Zygaenas and Syntomids, and sometimes gives the living moth a characteristic odour of fennel or musk, etc.

Hampson, who has monographed the greater part of the Arctiidae, has attempted to give a characterisation of the entire group from the venation, but the classification based on the neuration compelled him to remove from the Arctiids certain groups which undoubtedly belong to them, viz. *Nyctemera*, *Callimorpha*, *Pericopis*, etc. On the whole we may nevertheless accept it as a character common to all the Arctiids s. str. that the costal and subcostal of the hindwing are coincident for some distance, while these veins in other moths often only touch, e. g. in the Noctuids, and remain separate nearly throughout, and in the other Bombyces are generally altogether separate or only united by a transverse veinlet. We abstain, however, from a generally applicable definition which is based on a single organ, and only characterise the Arctiids as usually brightly coloured agile moths, many of which have the habits of butterflies, the tongue being usually well developed and the legs strong and very mobile. The antennae of the ♀♀ are usually setiform, those of the ♂♂ also sometimes hardly or only slightly pectinate, more rarely with long, feathery pectinations. Larvae stout, sometimes densely covered with hair; pupae stumpy, generally smooth, often appearing polished. Their distribution extends over all the continents and larger islands as far as the Arctic zone.

We here divide the known Palearctic Arctiids into the following groups, which do not represent scientifically established subfamilies, but are only artificial divisions proposed for the sake of lucidity:

1. **Nolinae.**
2. **Lithosiinae.**
3. **Hypsinae.**
4. **Micrarctiinae.**
5. **Spilosominae.**
6. **Arctiinae s. s.**
7. **Callimorphinae.**
8. **Nyctemerinae.**

A few other groups which should be placed with these, such as *Phaegopterinae*, *Pericopinae*, etc., have no representatives in the Palearctic fauna.

I. Group: **Nolinae.**

This group consists of about 200 species distributed over the whole globe, about one-fifth of which occur in the Palearctic region. A conspicuous feature of these moths are spots on the wing with erect scaling. The wings themselves are rather broad, grey or brown in colour, with fine and sharp markings. The tongue may be aborted, but is usually strongly developed; frons and face densely covered with hair; palpi variable in length. Legs slender with long tibial spurs. Larvae stout, hairy, the larvae living exposed are covered with thick, long, hairy fur. They live on lichens, the inside of stalks, or even on leaves, into which they do not, however, eat holes, but of which they only gnaw off the surface, leaving the stratum of the leaf. They pupate in a boat-shaped cocoon; the pupa is thin-skinned, and the moths appear after three or four weeks in the summer. The insects settle on trunks of trees and on the underside of leaves, often also on telegraph poles. The European species are not common, many being even rare and mostly very local. They are on the wing at night, only flying in day-time when disturbed, and their movements resemble those of the Micro-Lepidoptera.

Herrich-Schäffer pointed out their close relationship to the Cymbids and Sarrothripids, which is very evident in the shape of the cocoon, as well as in the structure of the body. But as Hampson places *Hyblaea*, *Blenina* and other undoubted Noctuids among the *Sarrothropinae*, the genera *Sarrothripa*, *Earias*, etc., may be separated from the *Nolinae* and be dealt with among the Noctuids.

1. Genus: **Nola** *Leach.*

This genus embraces about 40 species, which are distributed over the entire globe. By far the greater number inhabit Australia, from where over a dozen forms are already known. Only one species occurs in Europe; the remainder of the genus is scattered over all parts of the globe. The Nolas have a rather large, ovate head, strongly convex, large eyes, no ocelli, long porrect palpi with a densely scaled middle segment. The antennae are considerably more than half the length of the costa, and strongly ciliate in the ♂. Thorax strongly built, without tufts; legs slender, the middle tibia with a pair of spurs. Wings very broad, with strongly curved costal margin, and long oblique outer margin, the margin of the hindwing rounded and bearing long fringes. Abdomen regularly cylindrical, projecting beyond the anal angle only very slightly or not at all. The larva of only one species is known, stout, with 14 legs, rather sparsely covered with hairs; pupa a little depressed in the centre. The moths like to settle on barked timber, e. g. telegraph poles.

cuculatella. **N. cuculatella** *L.* (= palliolalis *Hbn.*) (10 b). Forewing light ash-grey with dark grey-brown basal area, which is separated from the light grey outer portion of the wing by a black curved line with a whitish edge on the outer side. In this *cuculatella* differs from *Roeselia togatulalis*, which is the only similar species, but is twice as large. The whole of Central and South Europe, Spain, Italy and the Balkan Peninsula. — In continental specimens the whitish grey outer portion of the forewing is usually fairly uniform in colour, with hardly any darker shading. — In English specimens this outer portion is dark *fuliginalis.* brownish; this is **fuliginalis** *Steph.* — Larva flat and short, with hairy warts, yellowish grey with broad, light, dorsal stripe, dark lateral lines and black head. It hibernates, and feeds until May or the beginning of June, lives on fruit-trees, sloes, white-thorn, mountain-ash and other deciduous trees; it pupates in a boat-shaped cocoon which is intermixed with woody fibres, the walls being first built up and the cocoon then closed at the top. The moth not rare in July, on boards and fences.

impura. **N. impura** *Mann* (10 c). Like the preceding, but the dull white outer portion of the forewing crossed by transverse ochre-brown shadowy stripes, one of which contains the minute discocellular dot. Asia Minor, Palestine and Syria, also from Brussa.

crambiformis. **N. crambiformis** *Rebel.* Dirty ashy grey, forewing with a pale brownish tinge; a transverse line, externally elbowed below the cell, between the basal third and the rest of the forewing; another line, light, edged with dark on its inner side, and bent at the costa in the ♀, borders the outer portion and runs straight from the costal to the inner margin. A dark, irregular, wavy line runs through the marginal area itself. The same size as *impura*, but the body more delicate and slenderer; moreover, it is characterized by very long, porrect palpi, which give the insect the appearance of a *Crambus*. One ♂ from Püngelers collection from Uralsk; the ♀ described by Rebel from specimens from Orenburg.

microphasma. **N. microphasma** *Butl.* Only in Japan, where it reaches the Palearctic region on the main island; otherwise an Indian moth. The outer portion of the forewing is traversed by rows of spots instead of transverse shadowy lines; hindwing thinly scaled. On the forewing the erect scales are in the same places as in *cuculatella*, viz.: above the base, over the centre of the wing, and below the costa before the apex of the cell.

phaea. **N. phaea** *Hamps.* (10 c). Only the ♀ known. Uniformly dark grey-brown in colour, shaded with black, the central portion slightly darker; a blackish longitudinal spot above the base and another above the apex of the cell of the forewing. I-chang on the Yang-tse-kiang.

2. Genus: **Roeselia** *Hbn.*

Generally more strongly built moths, resembling the preceding in the shape of the wings and facies. Head proportionately smaller, forehead narrower, palpi often curved downwards or porrect; antennae long and slender, ciliate or bi-pectinated in the ♂. Wings broad, the apex being sometimes more pointed than in *Nola*, subcostal of forewing with 4 branches. Larva from brownish yellow to flesh-colour, on deciduous trees; it gnaws the epidermis from the leaves, so that a white, minutely reticulate spot results. Pupa in a boat-shaped cocoon. About 50 species known to-day, which are distributed over all temperate countries, with the exception of continental Africa, whence no form has been recorded; two species, however, are known from Madagascar.

R. togatulalis *Hbn.* (10 c). Forewing ashy grey, clouded and marked with a duller shade. A *togatulalis.* blackish brown shadowy stripe, slightly convex on the outer side, runs through the centre and divides a larger outer portion from a smaller inner one. Through the outer area runs a sinuous darker line, which is more distinct at the inner margin. In Central and Southern Europe, and Asia Minor, in sandy districts. Larva bright foxy red, fairly densely covered with hairs; with dark lateral stripe. Until May on low oak-bushes, in sunny spots. Pupa brown in a yellowish boat-shaped cocoon, attached to twigs of oaks. The larva remains on the underside of leaves by day, but easily betrays itself by the unmistakable reticulate transparent spot in the leaf. Moths at the end of June and July. They must be immediately killed, as they begin to fly very soon after emerging from the chrysalis.

R. albula *Schiff.* (= albulalis *Hbn.*) (10 c). Much smaller, scarcely half as large as the preceding. *albula.* Ground-colour of forewing whitish, the median shadowy stripe narrower, forked towards the costa. Hindwing lighter at the base. In the ♀ the dark shadowy transverse line which runs through the centre of the forewing is a little broader. In ab. **fascialis** *Spul.*, the whole median area is darker and the marginal *fascialis.* area grey-brown, the latter being traversed by the sharply defined light wavy line. The whole of Central and South Europe, northward as far as Finland and Great Britain, throughout Northern Asia to Corea and Japan, here on the main island and Kiushiu. — Larva pale yellowish brown, with shorter whitish hairs and single long brown bristles, with double grey dorsal stripe and uninterrupted black subdorsal line. Until June, on brambles and watermint; the moth in July, not common.

R. scripta *Moore* (10 c). Only as large as *albula* and not unlike it in the markings, but the whole *scripta.* insect almost uniformly slate-grey, slightly tinged with blue; the hindwing also unicolourous, not lighter at the base as in *albula*, where the basal portion of the hindwing is almost white. Kashmir; the almost inseparable form *inscripta Moore* occurs on Indian territory (Sikkim).

R. gigantula *Stgr.* (= gigas *Butl.*) (10 d). Twice as large as the two preceding species, similar to *gigantula.* *togatulalis* in shape and size, but the apex of forewing more pointed. Uniformly brownish grey in colour, in the outer portion of the cell a dark, silky patch of raised scales, and similar smaller patches below the costa near the base and before the apex of the forewing. The latter is traversed by several dark wavy lines, which often portion off a slightly darker median area, which is broadened at the inner margin. Near Amasia in Asia Minor, on the Ussuri, and in Japan on the main island and Hokkaido.

R. maculata *Stgr.* (10 d). As large as *gigantula* and with similar markings, but the wings con- *maculata.* siderably lighter; the outer area of the forewing almost dull white, distinctly traversed by dark dotted lines beyond the centre and before the margin. The patch of raised scales in the cell very densely scaled, dark and conspicuous, hindwing light grey, only darker towards the apex. In Amurland, on the Suifun (Doerries), and near Vladivostock (Graeser).

R. nitida *Hamps.* (10 d). Size and shape as in the preceding, but basal and outer portions of the *nitida.* forewing silvery white, a dark costal spot at the base and a brownish yellow transverse band before the centre. Before the apex a smaller costal spot, from which proceeds a dark, dentate line which is interrupted at the submedian and borders the marginal area, the latter being slightly tinged with copper-colour and several times constricted. In Kashmir, also distributed over the Indian Himalayas. — Larva according to Harford pale yellow, first and last segments orange; on segment 3 a double black spot and a single one on segments 6, 10 and 11, a red hairy tuft behind the head. On Ilex, chewing the edges of the leaves from underneath. At each change of skin the old skin remains hanging on the hairy tuft behind the head. Pupa boat-shaped, attached to a twig and covered with bits of bark, also the red tuft of hair and the old head-capsules being used.

R. fumosa *Butl.* (= strigulosa *Stgr.*) (10 d). Much smaller than the preceding forms. Dark grey, the *fumosa.* darkly shaded median portion edged basally by a line which is convex at its inner side and finely dentate at on its outer egde. Wavy lines, interrupted several times, traverse the median and marginal areas. The raised patches of scales below the costa small and low. Amurland, Corea and main island of Japan. In July, locally common. Larva in May and June on oaks (Graeser).

bryophilalis. **R. bryophilalis** *Stgr.* (10 d). Similar to the preceding, only darker grey; but the dark transverse stripes which cross the median portion are visibly darker, especially in the costal area of the forewing, and form an obtuse angle at the median. A white, comma-shaped dash is placed below the middle of the costa. In Amurland and on Askold, end of June and July.

triangulalis. **R. triangulalis** *Leech* (10 d). Similar to the two preceding, also dark grey, but much larger, as large as *gigantula* and *togatulalis*. Large black raised blotches are situated at the base, in the middle of the cell and in the apex of the cell of the forewing. The slightly curved outer discal line bounds the lighter marginal portion, which is also traversed by an irregular darker wavy line. Japan (Satsuma).

tigranula. **R. tigranula** *Püngl.* (10 d). Forewing clear silvery white with the usual raised blotches of scales near the base, before the middle of the costa, and in the apex of the cell; hindwing uniformly dark grey with light fringes. Found by Korb at Kasikoparan in Russian Armenia.

costalis. **R. costalis** *Stgr.* (10 e). As large as the preceding, but the forewing dull instead of clear white, and traversed by dirty grey bands before the margin and in the centre. Hindwing lighter grey than in *tigranula* and a little smaller. The patches of scales small but rather high; there is generally a black spot near the one at the apex of the cell. Near Chabarovsk in Amurland, at the Ussuri and on Askold, in July.

acutula. **R. acutula** *Püngl.* (10 e). One of the most delicate forms of the genus; forewing long, pointed and proportionally narrow, thinly scaled, light yellowish grey. The 3 usual patches of scales near the base, at the centre and at the apex of the cell. A curved line, concave towards the base and running directly onto the patch of scales situated in the middle of the cell, on which it is acutely elbowed, bounds the rather darker basal area. The marginal area is limited by an outer transverse line, S-shaped and interrupted at the median vein. Hindwing transparent light grey-brown, with very long fringes. Found by Rückbeil near Aksu in Turkestan, in May.

strigula. **R. strigula** *Schiff.* (= strigulalis *Hbn.*, lineolalis *Er.*) (10 e). Considerably smaller than the preceding, but with much brighter and more vivid markings. The 3 patches of scales at the base, middle and apex of the cell rather large. Before and again behind the centre of the forewing there is a slightly curved dark transverse line edged with a lighter shade. In the basal and marginal areas the black veins are sharply defined on the light ground. Throughout Europe with the exception of the Iberian Peninsula, from Scandinavia to Italy, and from France and England to the Balkan Peninsula and Asia Minor. — In specimens from Great Britain and Ireland the outer portion of the wing is darker; this is the form *monachalis.* **monachalis** *Haw.* — Larva more or less reddish yellow ochre, with broad yellow dorsal line edged with brown, with light hairs, a black spot on segment 7; head dark brown with a yellow triangular spot. Until the beginning of June, on young oaks. Cocoon like parchment, intermixed with fibres of bark. Moth in June and July. Püngeler informs me that he considers Treitschke's statement that it also occurs in April a mistake. Anyhow, the occurence of a second brood in Central Europe has not been proved.

3. Genus: **Mimerastria** *Butl.*

The name is taken from a superficial resemblance of this genus to the Noctuid genus *Erastria*, which caused the author of the first discovered form to describe it as such. Distinguished from the preceding genus by the antennae of the ♂, which are ciliate and not bipectinate. 4 species are known, one of which occurs in North America, another very small one in Ceylon, the two others inhabiting the Palearctic region.

mandschuriana. **M. mandschuriana** *Oberth.* (10 e). Thorax and forewing white, the median area brownish with light and dark shading; a white submarginal line shaded with brown on both sides; abdomen and hindwing light brownish grey. From Suchan and Ussuri, near Chabarovsk and Vladivostock, on Askold, in Corea and Japan.

longiventris. **M. longiventris** *Pouj.* (10 e). Size and shape of the wings as in the preceding, but more robust, with stouter thorax and larger head. The inner portion of the marginal area of the forewing, which is clear white in *mandschuriana*, as well as the basal portion are slightly clouded with brown. Near Mupin in Sze-chuen; also found in Further India.

4. Genus: **Melanographia** *Hamps.*

This genus, erected by Hampson for only two species, is Indian, but one of the species has also been found in Fuchow and Tse-kiang. According to Hampson it is distinguished from *Nola* by the branch of the subcostal which runs to the outer margin of the forewing and which Hampson calls vein 7, originating beyond the subcostal vein 10 in this genus, while in *Nola* it branches off before the origin of that vein.

flexilineata.

M. flexilineata *Hamps.* The only species occurring in the Palearctic region, which is unknown to me in Nature, is described as grey sprinkled with brown dots, with raised scales near the base, in the middle and at the end of the cell; the basal portion is tinged with a brownish shade; the line which bounds it is black and bent at the cell, below it and at the submedian; traces of a parallel line are indicated on its inner side. The line bounding the outer portion begins at the centre of the costa and continues in the shape of a curve which is proximally concave.

5. Genus: **Celama** *Walk.*

60 species are known of this genus, which is distributed over all five continents. The insects are generally quite small grey moths, with a comparatively strong body and broad wings. Tongue well developed, palpi porrect, projecting for the length of the head. Spurs of the tibiae well developed. The antennae of the ♂ may be either pectinate (Subgenus *Deltapterum Hamps.* and *Celama s. str.*), or ciliate (Subgenus *Epizeuctis Meyr.* and *Aradrapha Walk.*). The larvae of only very few species are known: they resemble those of *Lithosia* and some of them like these feed on lichens. Pupa in a cocoon made of the leaves of trees, and sometimes also covered with lichens. The moths are on the wing in July, and rest on boards and trunks of trees covered with lichens, their wings being folded flat in roof-shape. Many species appear to be very rare.

cicatricalis. *infumatalis.*

C. cicatricalis *Tr.* (10 e). Ashy grey, forewing thickly dusted with brown, with three patches of raised scales, near the base, in the middle and at end of the cell. A number of curved lines, sometimes reduced to rows of spots, run from the costa to the inner margin. Sometimes all the markings are interrupted by the dark irroration, and the wings then have a checkered appearance, as if they had been sprinkled with fine pepper. SPULER names specimens with smoke-grey wings ab. **infumatalis.** Central Europe and Central and Eastern Asia, specimens exactly like European ones being found as far east as Chabarovsk and Vladivostock (STAUDINGER); in Europe southward to Southern France and Central Italy. Larva similar to that of *Lith. deplana*, in June and the summer on lichens on oaks and beeches. The moths from hibernating pupae in the spring (PÜNGELER, GRIEBEL), and again in July and August (SPULER) on the trunks of beeches, not rare locally.

ancipitalis.

C. ancipitalis *H.-Schäff.* (= tuberculalis *Mann*) (10 e). Very similar to the preceding species, but more robust, the thorax broader, with black centre, the abdomen ringed with dark brown. The forewing broader, with longer outer margin, more even grey colouring, the markings thinner and more complex, the lines which in *cicatricalis* are simple being mostly doubled or even trebled in consequenc of the appearance of dark and light borders. The spots of raised scales as in the allied species. From Croatia and Dalmatia, appears to be rare.

confusalis.

C. confusalis *H.-Schäff.* (= cristulalis *Dup.*). Intermediate between the two preceding in size and colouring, but the markings coarser, the lines more distinct, especially that which separates the marginal and central portions. This line starts with a dark costal spot before the costal spot of raised scales, runs around the apex of the cell in a large curve, is angulate at the lower radial branch, and at the submedian once more forms a shallow curve towards the margin. Several small linear teeth project from it basad. Hindwing with very long and extremely fine whitish fringes. Distributed over the whole of North and Central Europe as well as over the northern part of Asia; from Scandinavia and Finland southward to Northern Italy, and from Belgium and France eastward to Amurland, North China and Japan; also in Northern India. — Larva green or brownish with light dorsal stripe and small yellow warts bearing dark hairs; on segment 6 a brown transverse spot; in the autumn on bushes of oak. Pupa in a cocoon ornamented with bits of leaves, between leaves; moths in April and May, on tree-trunks and boards, not rare.

centonalis. *atomosa.* *candidalis.* *turanica.* *impudica.*

C. centonalis *Hbn.* (? = aerugula *Hbn.*) (10 f). Very variable, usually recognisable by the lighter marginal portion contrasting with the checkered grey median area. Slightly smaller than the preceding, the forewing more pointed, the hindwing shorter; the first transverse line bent at the median, the posterior one finely and irregularly dentate. Hindwing with a lighter marginal area, which is straight at the marginal side. Throughout Europe and Northern Asia, from Finland and Livonia to Corsica and Spain, and from England and France to the Amur, China and Japan, where it occurs on the Main Island and Hokkaido. — **atomosa** *Brem.* (10 f), which is the usual form in Eastern Asia, also occurs in Europe as an aberration, near Aachen (PÜNGELER) and at the Riviera. It is almost quite white. — In ab. **candidalis** *Stgr.* the median area of the forewing is more unicolourous. — **turanica** *Stgr.* is smaller and the forewing of the ♂ has scarcely a vestige of brown: Ferghana. — The form **impudica** *Christ.* is perhaps also to be placed here. — Larva flesh-coloured, covered with dark yellow-brown hairs, with yellow dorsal stripe edged with dark, and running through a row of dark V-shaped markings; very fine lateral stripe and black-brown head; on species of clover and other herbs, also on birches (HERING). More often on sandy ground; moth in June and July.

cristatula. **C. cristatula** *Hbn.* (= cristulalis *Hbn.*) (10 f). A little smaller still than the preceding; a light line generally runs between the marginal and central areas, curving outwards towards the margin behind the apex of the cell, following the outer transverse line. Chiefly in Central Europe, Germany, Austria. and Switzerland, northwards into Russia and southwards as far as Spain. *subchlamydula.* — **subchlamydula** *Stgr.* occurs in South Europe, in Spain, Italy, Dalmatia and Greece; also found as an aberration in Baden (Gauckler). In this form the forewing is shaded with brown, especially the central area, and sprinkled with small black scales. *minutalis.* — **minutalis** *Leech* (10 g) is an Eastern form, described from Japan, with an uniformly white forewing and less distinct transverse lines. It is perhaps better placed with the next species. — Larva similar to that of *centonalis,* violet brown or greenish with dark dorsal line running across some V-shaped marks, and yellow warts bearing brown hairs. Until June, on water-mint and Teucrium; the moths local but not rare, in June and July.

chlamitulalis. **C. chlamitulalis** *Hbn.* (= chlamydulalis *Tr.*) (10 f). Forewing creamy white, with rather faint markings; the marginal area dark with irregular edges, and traversed by light and dark lines. Hindwing whitish, with grey curved shadows on the disc and before the margin. In South and South-East Europe as well as in Asia Minor. Larva yellow with black head, reddish dorsal line, and dark, wavy lateral stripe, above and below which there are dark spots. In the autumn, on Odontitea lutea; the moths in April.

candida. **C. candida** *Butl.* (10 g). Wings of the ♂ more rounded. Forewing white with dark base and margin, and black-brown median band; hindwing almost clear white. The moth is very similar to a small ♀ of *Roeselia albula.* In the light marginal portion before the outer margin there is a dark W-shaped mark, and behind the middle of the forewing a dark dot. North China, Corea, Japan.

angulata. **C. angulata** *Moore* (10 g). Very small, forewing white, slightly tinged with brown, especially at the costa and outer margin. Directly behind the base, before and behind the middle as well as before the margin there are dark transverse bands of varying width; hindwing very slightly tinged with brown, especially at the costa. In Kashmir, but also distributed over the Himalayas and the whole of Anterior India, as far as Ceylon.

squalida. **C. squalida** *Stgr.* (= musculalis *Saalm.*, fraterna *Moore*, vanhasselti *Heyl.*, ceylonica *Hamps.*, desmotes *Turn.*) (10 g). An extremely small, but very variable insect. Three transverse bands traverse the lighter ground-colour, which is almost pure white in typical specimens; the first of these is near the base, the second, which is lighter in the centre, crosses the median area and bounds it marginally, and a third runs along the margin. However, the ground-colour of the forewing may be more or less dusted with grey; only the outlines of the dark transverse bands may be distinguishable; a dark median spot may be hidden in the dark middle shadow, or may be quite distinct. If all the forms which Hampson places in this species belong together, its area of distribution is very large, and extends over South Europe (Spain) and Asia Minor eastward to the Pacific coasts of China and from Kashmir throughout India and Australia, over the Malay Archipelago and the South Seas; also over Madagascar.

innocua. **C. innocua** *Butl.* (= costimacula *Stgr.*) (10 g). In this species the transverse bands of the forewing are replaced by costal spots; only the one before the centre is continued as a narrow line to the inner margin. This line is more angulate at the median in specimens from the Amur and Formosa than in those from Japan. Amur, Formosa, Japan; caught in June.

flexuosa. **C. flexuosa** *Pouj.* (= sikkima *Moore*) (10 g). Larger and more unicolourous than the preceding; forewing dull leather-yellow to greyish yellow, the proximal median line strongly curved and bounded basally by rows of brownish dentate spots, and marginally by light edges. Hindwing whitish in the ♂, dull brown-grey in the ♀. Mupin in West China, also in North India.

karelica. **C. karelica** *Tengstr.* (= arctica *Schoy.*, obsoleta *Rtr.*). This species is said to have a white head and collar; abdomen slightly tinged with grey-brown. Forewing white with the usual patches of raised scales in the middle and at the end of the cell; a few costal dots near the base. The first transverse line not reaching the inner margin; the outer one finely dentate. Hindwing whitish in the ♂, dull and pale in the ♀. In Finland and South Waranger, on peat-moors. *inconspicua.* — In the form **inconspicua** *Alph.* the median portion of the forewing is suffused with reddish brown; from Kuldja.

aegypliaca. **C. aegyptiaca** *Snell.* (10 g). Scarcely more than half the size of *flexuosa.* Forewing dull reddish grey, the basal portion beneath the costa sprinkled with black. The outer portion of the forewing slightly lighter; the patches of scales in the middle and apex of the cell dark. The outer line is composed of black dots, encircling the apex of the cell, being broader from the median, dark brown, distinct, reaching the inner margin beyond the middle of the latter three small curves. This outer line is edged with light distally. Another light line extends along the margin in irregular waves; a broad dark line runs over the base of the fringes. Hindwing almost transparent, duller at the apex and margin. From Egypt.

thymula. **C. thymula** *Mill.* (10 g). Grey, forewing slightly tinted with yellowish brown, the marginal area clearer grey. The inner transverse band runs from the costa first in the direction of the outer margin, but then curved sharply elbowed on the central patch of scales, and then runs as a deep black line almost directly to the inner margin. The outer transverse line curves sharply towards the margin already on the subcostal, encircles the apex of the cell in a broad double curve, and is accompanied on ist inner side by a pale parallel line. There are a few brownish shadowy spots distally at the costa. In Southern France and in Spain. — Larva dull brownish yellow, with black head, small hairy yellow dorsal and dark lateral warts, a dark dorsal line and a red lateral one. Pronotum black, with pale divisional line. On thyme.

6. Genus: **Pexinola** *Hamps.*

In 1900 Hampson erected this genus for a ♀ found at Yatung in Tibet, and placed it at the end of the *Nolinae*. This seems scarcely the correct place for the insect — which is, however, unknown to me —, if Hampson is right in excluding *Sarrothripa*, to which *Pexinola* seems to me to be nearly related, from the Arctiids and placing that genus among the Noctuids. As I have not had an opportunity of examining the specimen, I here verbally quote Hampson's diagnosis:

> Proboscis fully developed; palpi porrect, extending quite three times the length of head and strongly curved downwards, the 2nd joint fringed with hair above and with tuft at extremity below, the 3rd well developed; antennae of ♀ minutely ciliated; legs long and slender, the spurs long. Forewing elongate, narrow, the apex produced and acute; veins 2 and 3 curved, the former from close to angle of cell, the latter from angle; 4 from angle; 5 from above angle; 6 and 7 separate from below angle of cell; 8, 9 shortly stalked; 10, 11 from cell free. Hindwing with vein 2 from middle of cell; 3, 5, from angle; 4 absent; 6, 7 coincident; 8 from middle of cell; the median nervure and vein 1 strongly pectinated above.

P. longirostris *Hamps.* ♀. Head, thorax and abdomen grey-white, strongly mixed with black. Forewing grey, suffused with olive-brown and strongly irrorated with black; an antemedial ridge of blackish scales tipped with white from subcostal nervure to vein 1; tufts of similar scales below the cell at origin of vein 2 and at upper angle, the latter with indistinct blackish line from it, bent outwards above inner margin; a diffused dark waved subterminal line. — 32 mm. — 1 ♀. Yatung. *longirostris.*

7. Genus: **Poecilonola** *Hamps.*

Hampson places into this genus 3 forms which, besides a slight difference in venation, are only distinguished from most other *Nolinae* by the somewhat more upturned palpi. The species are among the largest of the whole subfamily, and are rendered rather conspicuous by the varied and contrasting colours. One species inhabits Ceylon, another the Indian Himalayas. A few years ago an additional form has been described from the Palearctic Himalayas.

P. chionobasis *Hamps.* ♂: palpi and forehead black; vertex and thorax pure white; antennae dark brown excepting the tip, and a spot on the metathorax of the same colour; breast, legs and abdomen of a brown tint, tarsi ringed with white. Forewing pure white; at the middle of the costa a large triangular spot which bears dispersed silvery scales, and whose apex reaches to the median vein, its outer margin being strongly indented; marginal area black-brown, its inner edge wavy, and elbowed towards the cell at vein 3; an irregular row of black markings before the margin. Hindwing with white basal half and brown outer half. 14 mm. Described by Hampson from a single ♂ from the Kangia-Valley (Kashmir). *chionobasis.*

2. Group: **Lithosiinae.**

This group consists of about 250 genera with a little more than a 1000 known species; and we must suppose that the greater number of forms of many genera have not yet been discovered. Many genera resemble Microlepidoptera in appearance and as the Microlepidoptera are notoriously much neglected by collectors, it is certain that many *Lithosiinae* have been overlooked. Certain species, moreover, avoid the light, remaining hidden in bushes or in crevices of bark, where they are well concealed, and seldom or never fly in day-time. As has already been mentioned in the introduction to the family, most lepidopterologists recognise in the *Lithosiinae* a very old group, an ancestral form, from which many of our modern chief groups have arisen by development in different directions. There is an unmistakable affinity to the Noctuids; on the other hand, an almost uninterrupted line of transitional forms leads to the brightly coloured diurnal tiger-moths, which inhabit the temporate regions, and to the more tropical *Agaristidae*, which occur especially in warmer countries. Undoubtedly the *Lithosiinae* are closely allied to the *Nolinae*, but the larvae have 16 legs, i. e. the first pair of abdominal legs is not aborted. On the other hand, in the arrangement of the hairy warts the larva resembles the Syntomids, and the moth itself also shows some affinity to them. Among the Noctuids they seem especially to be connected with *Sarrothripa* and *Earias* through the *Nolinae*, and with the Acronyctids through the *Arctiinae*.

Nearly all true *Lithosiinae* are small moths; the majority of the Palearctic species are small, and it has also been found on reconsideration that certain conspicuously large exotic species are better placed into other groups. The largest of the Palearctic species is *Oenistis quadra*, which is exceeded in size by only very few Exotics.

Head widest transversely, usually with the frons flat and covered with appressed scales, with dot-like and strongly convex eyes, and without ocelli; antennae very slender, hair-like, soft and very fragile; palpi not extending far beyond the head, generally short and upturned. Tongue variable, usually strong. Thorax short and stout, with strongly curved back, which is usually smoothly scaled and often ornamented with metallic or brightly coloured spots or dots. Legs strong, the coxae often very long. Abdomen in the ♂ slender, in the ♀ sometimes club-shaped, usually not extending beyond the anal angle of the hindwing, and often not even reaching it. Forewing frequently linear with a very long inner margin; hindwing often very large, proportionately larger than in any other Lepidopteron. When the insect is at rest the hindwings are folded radially like a fan, and the forewings shifted so far one over the other that the costal margins of both wings are almost parallel and the shape of the insect becomes linear. The venation varies considerably in the different groups. Areole of the forewing present or not; on the hindwing the neuration is sometimes reduced to only two veins, this being almost unique among Lepidoptera.

The colouring of the *Lithosiinae* is predominantly yellow, white or pink. The forewing sometimes bears bright-coloured or black dentate transverse lines, and often a broad costal stripe. The hindwings are nearly always unicolourous, at most there are small dark bands or marginal spots; the underside is generally without markings.

The larvae are as yet but very little known. They live on the trunks of trees and rocks, under wall-stones, etc., where they generally feed on lichens. As the latter often grow singly and very far apart, the larvae, when they have finished one plant, are compelled to search for another, and to that end they are often enabled to travel very fast. On bare rocks in Australia I frequently found the larva of *Eutane*, which is common there, running about with remarkable agility in order to get at the lichens, which grew far apart, so as to avoid any considerable period of abstinence. Other species which feed on lichens, as for instance *O. quadra*, are also able to live on the leaves of trees so that they do not die of hunger when lichens are scarce.

The larvae are uniformly cylindrical, often with a comparatively larger head than the true *Arctiinae*; rows of warts bearing stiff bristly hairs along the back. Many of the larvae of *Lithosiinae* lie concealed in crevices of tree-trunks in day-time, others run about in the burning sun-shine searching for food. The pupae are found in crevices of bark, or under stones, often a large number together, lying in a light cocoon or even only supported by a few threads. In the Palearctic region the moths have only one brood, but this often extends over months. They rest on leaves and flowers, especially on Scabious, and when touched frequently drop off to conceal themselves in the grass; many obstinately feign death. Most of the species are common, but only very occasionally occur in abundance. They fly by day as well as by night, and the larger species appear sufficiently protected by the exudation of the oil-glands of the thorax.

1. Genus: **Stigmatophora** *Stgr.*

Frons very broad and flat, eyes very far apart, antennae filiform; thorax with smooth scaling, hairy anteriorly and on the tegulae. Hindtibiae rather thick, with long spurs; abdomen of the ♀ club-shaped. Wings, broad, especially the hindwings. Eight species in Palearctic East Asia and the neighbouring districts of India, with red or yellow to white ground-colour, not rare in July on downs and grassy forest-roads. — Larva on lichens growing on stones.

micans. **S. micans** *Brem. & Grey* (11 a). Forewing white edged with orange-yellow, and with rows of distinct black dots, one before the margin, with the dots close together, two through the centre; a black spot at the base. Hindwing ivory-yellow, also edged with orange-yellow, usually with irregular dark dots before the margin. In the whole of North Asia, from the Altai to the Amur, in Corea, North and Central
alboscricea. China, southwards to Shanghai, where it is represented by the form **alboscricea** *Moore*, which is distinguished from the first-described form by almost white hindwing. Larva full-grown 4 cm. long, very slender, blue-grey, with pale yellow spots and dots, which replace the ground-colour above the feet. A broad stripe on the back composed of yellow spots. Head slightly heart-shaped with brown mouth (Graeser). It lives until the beginning of July on mossy stones, and pupates in a silky cocoon, the pupa being stumpy and yellowish brown. The moth in July and August, in rocky places, common in many localities.

flava. **S. flava** *Brem. & Grey* (= ochracea *Led.*, sinensis *Walk.*) (11 a). Both wings uniformly orange-yellow, hindwing without markings, forewing with three rows of black dots as in *micans*, but the dots smaller, often obsolescent before the margin, the dot at the base of the forewing very small, almost invisible. On the underside the forewing is more or less suffused with black. From the Altai to the mouth of the Amur and Corea, on Askold, and also extending far to the south, over South China into the Malayan territories. ab. **leacrita** *Swinh.* (11 a), with more distinct dots above and without the sooty suffusion beneath on the disc of the forewing, comes from Japan and Southern China. The moths in July, locally apparently not rare (according to Graeser for instance at Blagoveshchensk). *leacrita.*

S. acerba *Leech* (11 a). At once distinguished from *flava* by the colouring, which is bright pink instead of yellow; hindwing and abdomen pale pink, thorax and forewing dark pink; the latter bears 5 dark stripes beyond the cell on the veins, which often connect the discal rows of spots. From Mupin in West China. *acerba.*

S. rhodophila *Walk.* (11 a). Body orange, wings tinged with rose-red, especially at the margin, sooty suffusions, varying in extent and shape, on the disc of the forewing between the veins at the base and before the marginal area. Amurland and North China, southwards to Shanghai, as well as in Corea and Japan, where it occurs both on the Main Island and on Hokkaido (Matsumura). Seems only to occur singly. Many authors place this species with *Miltochrista*, on account both of its rose-red colour and small size and of the shape of the wings, in which this species differs from the preceding. *rhodophila.*

S. torrens *Butl.* (11 b). Size and shape as in the preceding, but thorax and forewing bright dark pink, the blackish suffusions being reduced on the forewing to two undulating shadowy lines, which traverse the disc. Leech, whom Matsumura follows in his Catalogue, considers *torrens* a variety of the preceding species. *torrens.*

S. palmata *Moore* (11 b) only touches the Palearctic region at the southern frontier of Kashmir. size almost as in *micans*; pale yellow, with dark markings, the forewing bearing two basal dots one below the other, and then a transverse row of three large black dots, which have sometimes a steely blue gloss. The distal portion of the basal half of the wing is without markings, but the outer half of the forewing is covered with a network of radial streaks which leave a broad outer margin and stand close together. Before the outer margin of the hindwing there are also traces of such radial stripes. First described from Bengal. *palmata.*

2. Genus: **Eugoa** *Walk.*

This genus consists of a dozen small, grey, weakly spotted and banded species, which are mostly very like each other, and inhabit chiefly the tropics of the Old World. Only two forms, which are closely allied, reach the Palearctic region in Eastern Asia. Head broad, with flat frons; eyes far apart; tongue strong; palpi short, erect; antennae filiform, almost imperceptibly dentate in the ♂. Thorax short, stout. Legs strong, tibial spurs moderately long. Abdomen sometimes projecting a little beyond the anal angle. Forewing narrower and more pointed than in the preceding, usually mouse-grey or brown-grey, the Palearctic forms slightly marked with black. Nothing is as yet known of the early stages.

E. taeniata *Fixs.* (11 b). Forewing with a few fine costal dots on a slate-grey ground; before and beyond the median area irregular lines, here and there interrupted or thickened into spots. From the Bureja Mts. and Corea. *taeniata.*

E. grisea *Butl.* (11 b). Little larger than the preceding. Forewing also slate-grey, 2 black dots near the base, and 2 lines separated into spots beyond the middle and before the margin. From Japan; according to Matsumura also in Corea. *grisea.*

3. Genus: **Psilopepla** *Turn.*

Closely allied to the preceding genera, and united with them by Hampson, but with much narrower and more densely scaled wings, and altogether more strongly built. Nearly all 6 species inhabit the Himalayas, and all belong to the Indo-Australian fauna; only two of them occur in Tibet.

P. fasciata *Moore* (= promelaena *Hamps.*) (11 b). Forewing dark smoky brown with the exception of the outer third and an elongate spot at the base of tho inner margin. Behind the cell, this colour is extended marginally into a tooth. The marginal portion, which is bounded by a yellowish transverse line accompanying the tooth, is lighter and variegated with yellowish colour. Hindwing slightly transparent dark brown; a narrow shadowy line runs through the disc, parallel with the outer margin. From Yatung in Tibet. *fasciata.*

P. margaritacea *Walk.* (= margaritaria *Walk.*) is similar in markings to *Nud. mundana*, but without the distinct cellular spot, and the ground-colour of the forewing is more or less pure white or yellowish white. Yatung, also in Sikkim. *margaritacea.*

4. Genus: **Nudaria** *Haw.*

This genus, which only contains one species, differs from all the allied groups by the broad, very delicate and almost glassy wings, on which the markings are only seen as very pale, shadowy lines and spots. Head and body almost naked, only on the frons a very thin tuft of hair. Palpi short. Antennae enveloped at the base by a thick tuft of hair, so that they look incrassate. Body delicate, legs strong, with long, stout coxae, short femora, thin tibiae and long tarsi. Instead of scales, the wings are thinly covered with fine hairs; they are broad with the outer margin rounded. Larvae fairly plump, with small head, rather transparent skin and stiff hairs, not very dense but partially very long. They inhabit mountainous districts, especially frequenting overhanging rocks with lichen, and there one often finds large numbers of them together. In July they pupate in a loose oval cocoon, the pupa being thin-skinned and the moth already appearing after a few days. The moths rest, often gregariously, under slabs of rock, with the wings folded in roof-shape. One can also obtain them by beating the branches of firs. They then fly away slowly and steadily; yet their flight is more easy and adroit than one would except in moths with such delicate wings.

mundana. **N. mundana** *L.* (= transparens *Retz.*, nuda *Hbn.*, hemerobia *Hbn.*) (11 b). Body and wings dull smoky brown, wings semidiaphanous. Forewing with dark dot at the base, and two dark dentate lines before and beyond the centre, between which there is a dark central spot in the cell. In North and Central Europe, from Scandinavia and Finland to the Mediterranean, and from France to Anterior Asia, but scattered and generally only in hilly regions. Especially transparent specimens, which occur every- *dilucida.* where together with true *mundana*, are called ab. **dilucida** *Spul.* — Egg yellow; larva transparent glossy lead-grey or greenish, with fine hairs, which are longer and arranged in tufts anteriorly and posteriorly; the head black. Dorsally there are light spots, before and below which stand black markings. Until June on lichens on stones and walls. Pupa transparent greenish white, later yellowish, with deep black eyes and small minute dark dots on the back, in a loose cocoon which is protected by the hairs woven into it and is attached under rocks and flat stones. One often finds large numbers of these cocoons together. The moths appear in July and August, and settle in the same spots as the larvae and pupae. They are usually very abundant, wherever they occur, and I sometimes found moths, pupae and full-grown larvae together at the same time under the same slab of rock. The moths on the wings strongly resemble Neuropterids of the Chrysopid genus *Hemerobius*

5. Genus: **Comacla** *Walk.*

Head broad but low, frons flat; eyes small, far apart, the frons being broad; tongue narrow and delicate; palpi pointed, porrect, with long end-segment; antenna of ♂ ciliate. Thorax slightly longer than in *Nudaria*, abdomen stouter, somewhat more densely covered with rough hairs, in the ♀ woolly at the apex. Forewings curved downwards in the apical portion, so that the apex is rather pendant, broad, the apex itself rounded. Hindwing broad and long, the anal angle projecting beyond the abdomen. All wings dull light brown, slightly transparent, but considerably more densely scaled than in *Nudaria*. Larva stout, slightly more densely hairy, on lichens; the moth at damp spots where lichens grow. Three species belong here: one from Europe, a similar one from the Gaboon, and a unicolorous one from North America.

senex. **C. senex** *Hbn.* (= rotunda *Haw.*) (11 b). Not unlike *Nud. mundana*; the central spot at the apex of the cell distinct; a larger shadowy spot at the middle of the costa, and before the marginal area of the forewing a row of spots which are especially distinct in the costal region. Another curved row of spots bounds the basal third of the forewing. Sporadically in North and Central Europe, southward to the Alps and eastward to the Ural. — Egg round, yellow, larva ashy grey, very hairy, with black head. From the autumn to June on Jungermanniaceae. Pupa stumpy, dark brown, in a dense hairy cocoon. The moths fly in July on damp meadows, and are not rare in their flight-places; they come to the light at night (Spuler).

6. Genus: **Siccia** *Walk.*

Head very broad, eyes small and widely separated by the immense flat frons. Palpi upturned, not projecting beyond the vertex, or obliquely porrect. Tongue strongly developed. Thorax broad with slightly convex back, in the ♀ the tegulae far apart. Forewing long and much narrower than in the preceding genera, sometimes rather pointed, but the apex not bent down; hindwing more elongate. Abdomen of the ♂ moderately slender, that of the ♀ ending in a thick club, which is covered with wool. Hindlegs long, tibiae not incrassate. Hampson unites here about 20 species, which were formerly placed in different genera; they almost all occur in India and China, only 2 species inhabiting Africa.

S. taprobanis *Walk.* (= cingalesa *Walk.*, grammophora *Fldr.*, sinuata *Moore*) (11 b). The white forewing traversed by black dentate lines, between which there are black dots in the cell; hindwing grey with light fringes. The specimen figured is a very large ♀, the largest I have ever caught. Distributed throughout the Western Himalayas, from Kashmir all over India to Ceylon and Malacca. According to Hampson specimens from Dharmsala and Bombay are purer white than those from Ceylon. The moths settle on boards and tree-trunks, and when touched drop down. *taprobanis.*

S. sagittifera *Moore* (11 c). Similar to the preceding and like it varying much in size. The forewing on the whole purer white, the dentate lines absent or separated into dots; hindwing lighter grey. Kashmir (Kangra, Dalhousie district), widely distributed in the Himalayas, as far as Indian Sikkim. At higher altitudes. *sagittifera.*

S. obscura *Leech* (11 c). Very similar to the preceding, but some of the dark spots on the forewing united by slightly wavy or angulate transverse lines. The basal portion of the forewing, moreover, is suffused with dark grey, and the hindwing is considerably darker, almost as in *taprobanis.* Japan, said to be caught near Yokohama, described from there with a ? by Matsumura. I did not meet with it at Yokohama. *obscura.*

S. v-nigra *Hamps.* (11 c). This form is mentioned from Shanghai. I neither saw it in collections there, nor did I catch it myself; it does not therefore appear to be common. According to the figure not unlike *sagittifera*, but all parts of the forewing tinged with violet-grey. Through the centre of the forewing runs a smoke-grey shadowy band, which is produced distally into a strong tooth, and from which narrow streaks extend distad. *v-nigra.*

S. nilgirica Hamps. The first-described form does not occur in the Palearctic region, but only the race **cinereicolor** *Hamps.* (11 c), which is slightly irrorated. This is a very small moth, not larger than *minuta*, having somewhat the appearance of *sagittifera.* It is known from Shanghai, but occurs also throughout the area of *nilgirica*, often beside the latter form. *cinereicolor.*

S. sordida *Butl.* The ground-colour of the forewing of this widely distributed species varies from white to smoky grey. The markings are more constant, consisting on the forewing of a black dot at the base and two others near it below the costa and the cell; a further line of dots commences before the middle below the costa and runs to the submedian fold. The cell bears a dot in the middle. Another dentate line begins with a costal spot, curves outwards below the costa and is elbowed inwards on the submedian; on the disc a lunule, upon which follows a feebly dentate line, curved outwards below the costa, elbowed at veins 4 and 6, then bent inwards below the cell and outwards near the inner margin; beyond it an interrupted line excurved below the costa and in the centre, and then incurved; at the margin a row of dots, and the fringes with dots at the apex and in the centre. Hindwing of ♂ white, brownish towards the apex, that of the ♀ paler or darker brown (Hampson) according to the dark colouring of the ground of the forewing. This form occurs in China and India. In the form **subcinerea** *Moore*, from Kashmir and Formosa, the hindwing of the ♂ is entirely brown with white fringes, while in **quinquefasciata** *Hamps.* (11 c) the forewing is suffused with a dark colour. *sordida.* *subcinerea.* *quinquefasciata.*

S. minuta *Butl.* (11 c). Smaller than the smallest *taprobanis*, both wings deep dark brown, the forewing lighter in the median area, which is bounded on both sides by dark lines and bears an obsolescent dark spot in its outer portion; known from Yokohama. *minuta.*

7. Genus: **Hyposiccia** *Hamps.*

These small, white or light grey, moths, which have the facies of *Siccia*, are, as well as the next genus, separated by Hampson on account of small differences in the neuration from those forms with which they were formerly united under the name of *Acmene.* The genus is distinguished from *Parasiccia* especially by the shorter tibial spurs. It comprises 3 species, a Palearctic one from China and 2 similar, smaller forms from Assam.

H. punctigera *Leech* (11 c). As large as the largest forms of the preceding genus; cream-coloured, forewing with a few scattered black dots. From West and Central China. *punctigera.*

8. Genus: **Parasiccia** *Hamps.*

Distinguished from the preceding by the longer tibial spurs as well as by the upturned palpi reaching the vertex, which is not the case with the shorter palpi of *Hyposiccia.* The 5 species of this genus inhabit exclusively Asia.

P. altaica *Led.* (11 c). Forewing silvery white with numerous small and thick black dots, of which the discal spot at the apex of the cell is especially distinct. Behind this, the dots are arranged in two *altaica.*

flexuose lines which are about a millimetre apart. My specimens obtained at Yokohama have less markings than a specimen from Ussuri in PÜNGELER'S collection. *fasciata.* The smaller form **fasciata** *Butl.* is described from Hokkaido; it resembles the smaller specimens from the Altai in size, but has a stronger dark suffusion between the two rows of spots and at the base of the forewing. Both forms intergrade and are not geographically separate. From the Altai to Amurland (Vladivostock), and in Japan, North, Main and South islands. Not rare on Hondo in July. Pupae spun up together under stones (GRAESER).

punctatissima. **P. punctatissima** *Pouj.* Similar to the preceding in markings, but the forewing washed with dirty grey-brown, so that the small shadowy band behind the middle and the discal spot are less conspicuous. West and Central China, especially at the Yang-tse-kiang.

maculata. **P. maculata** *Pouj.* (11 c). Forewing differing strongly from those of the two preceding forms, being occupied for the greater part by an irregular brown spot, which leaves white patches at the base and margins. West China.

perirrorata. **P. perirrorata** *Hamps.* ♂ white, much speckled with brown, palpi with black markings. Forewing with obsolescent subbasal band; a curved antemedial band ends at the costa in a spot which is elbowed outwards below the costa; in the centre of the cell a dot and above it at the costa a spot; a discoidal lunule; a brownish band at the inner side of the postmedial line, the latter being excurved below the costa towards the centre and then strongly incurved, an irregular subterminal line elbowed inwards at the discal fold, and incurved below vein 3; a row of small spots at the margin. Hindwing white, washed with grey. Underside of forewing dark brown-grey; hindwing white with indistinct discoidal spot and irregular subterminal line. Described by HAMPSON from a single couple from Kia-ting-fu (♂) and the Omei-shan (♀).

9. Genus: **Melanaema** *Butl.*

This genus s. str. only contains one Palearctic species, which has extremely conspicuous colouring. Head broad, palpi quite short, just reaching the frons. Tongue strong, long. Thorax broad, especially at the shoulders, abdomen rather stout, just extending beyond the anal angle. Tibiae with moderately long spurs.

veneta. **M. veneta** *Butl.* A beautiful moth; all wings bright yellow with carmine margin and black veins. In Amurland and Japan, both on the Main Island and Hokkaido. In July and August, not common. At the same spot near Yokohama where this extraordinarily coloured moth occurred, I at the same time caught a Pyralid of exactly the same size and colouring; when on the wing the two species, which are not related at all, are only distinguished by observing the movements of flight, and also because the Pyralid always settles on the underside of leaves.

10. Genus: **Asuridia** *Hamps.*

This small genus, which has already the facies of *Miltochrista*, consists of one Chinese species and two from the Himalayas. The tongue, always well developed in *Miltochrista*, is aborted. Eyes large; palpi porrect but short, hardly extending beyond the head. Antenna of ♂ with thin bristles. Thorax short. Tibiae with moderately long spurs. Abdomen woolly, especially at its apex.

carnipicta. **A. carnipicta** *Butl.* (11 d). Rose-red, the forewing with three black transverse lines, the outer one of which runs around the discal dot; dark rays on the veins in the outer area. Hindwing pale pink; fringes of both wings blackish grey. From the Nankow Pass in China.

11. Genus: **Miltochrista** *Hbn.*

According to HAMPSON, who includes many of MOORE'S and WALKER'S genera in *Miltochrista*, the latter, which is also known as *Calligenia*, embraces over 60 forms. They are nearly all small graceful moths, pink or yellow in colour, with very characteristic fine markings, similar to those of *Asuridia* on the forewings. Head not nearly as broad as in most of the preceding genera; frons convex, much narrowed below; eyes large, prominent; palpi short, hardly extending beyond the head, porrect. Antennae long, nearly always considerably more than half the length of the costa, serrate, pectinate, almost filiform, with shorter or longer ciliae. Forewings of the ♂♂ with the costal margin often straight distally, so that the apical angle is very distinct. Larvae, as far as is known, stout with rounded head and long hairs, on lichens. Pupae in a cocoon intermixed with hairs. The moths have only one brood in the northern districts of their area; they settle on flowers at which they suck, especially Umbellifers and flowering shrubs, e. g. Viburnum, etc., and are generally only found singly.

ziczac.

M. ziczac *Walk.* (= inscripta *Butl.*, rivalis *Leech*) (11 d). Very like *Miniata rosaria*, but the ground-colour of the forewing grey, outer margin and apical half of costal margin deep blood-red, hindwing greyish pink instead of yellow; slightly larger than *rosaria*. Central, East and West China.

flexuosa.

M. flexuosa *Leech* (11 d). Larger, both wings deep rose-red, forewing almost blood-red. Basal and marginal portions of the forewing with fine black rays. Abdomen brown. West China.

inscripta.

M. inscripta *Walk.* (= erubescens *Butl.*) (11 d). A small species. Forewing purple-pink, with black transverse lines, hindwing black-brown; in the ♀ the hindwing bears pale purple spots before the margin. China: Shanghai.

bivittata.

M. bivittata *Butl.* (11 d). Like a small *aberrans*, with which many authors unite it. Forewing deep rose-red and hindwing paler. Two transverse lines traverse the forewing and separate the basal, median and marginal areas; from the outer one black rays extend to the margin behind the cell. Two black dots near the base, one in the cell and several before the margin. From Japan. Several times I found them in cob-webs, in which they seem easily to entangle themselves.

aberrans.

M. aberrans *Butl.* (11 d). Almost exactly like the preceding, not much larger, forewing mostly darker pink, and the black dots, especially those before the margin, more distinct and sharper. Amurland and Japan; I found the species near Shanghai, in June. — In the form **askoldensis** *Oberth.*, from Askold, the central one of the 3 black transverse lines is absent.

askoldensis.

miniata.

M. miniata *Forst.* (= rubicunda *Schiff.*, rosea *Esp.*) (11 d, e). The European „Red Arches" has flesh-coloured ground-colour, rose-red margin to the forewing, and on this wing a black dentate line beyond the middle, and black, elongate spots before the margin. In the ♂ the costa is curved upwards beyond the apex of the cell. Throughout Europe and North Asia, from Scandinavia and Finland to the Mediterranean, and from France to Amurland, Corea and Japan. In ab. **rosaria** *Butl.* (11 d), which is commoner in the east of the area of distribution than in the west, and is perhaps a distinct species, the ground-colour is more yellow; and in ab. **crogea** *Bign.* (= flava *Meyer*), the wings are quite pale yellow, the forewing being edged with bright yellow. — Egg oval, yellow. Larva grey, with blackish head, with long and dense hairs, hibernating, until June on lichens on walls and fences. Pupa black-brown, abdomen with yellow incisions, in a cocoon densely intermixed with hairs. The moth appears at the end of June and is not rare, but always occurs singly, in forests, at road-side ditches, etc., on Umbellifers or Scabious. It is usually resting on flowers, sucking, and is easily caught.

rosaria.

crogea.

rosacea.

M. rosacea *Brem.* (= undulata *Leech*) (11 e). Similar to the preceding, smaller, ♂ with the costa not bent upwards beyond the apex of the cell; the black dentate line behind the centre of the forewing is moreover often absent; in its place there is sometimes a row of blackish dashes or hooks; the cellular dot and the row of dots before the margin distinct. In Amurland, at the Ussuri, Suifun, on Askold, North and Central China; in July.

pallida.

M. pallida *Brem.* (11 e). ♂ pale yellow, forewing with darker margin, ♀ almost white. Cellular spot and row of spots before the margin distinct. In Amurland, at the Suifun, near Vladivostock, in the middle of July. According to Staudinger also in Corea and Japan. The similarity of the colouring to that of the much larger *Asura megala* (11 g), also known from Eastern Asia (Pekin), is most remarkable.

sanguinea.

M. sanguinea *Moore* (11 e). Rather small. Forewing dark vermilion, with black dots before the outer margin, hindwing on the contrary black with red spots before the outer margin. Underside purple-pink, with rows of black spots before the margin of the wings. Shanghai, from the end of June, not rare on the road to Sikawey, between cornfields, on Umbellifers. — Worn specimens resemble *Asura infumata*, which is more rust-coloured, and of which I only know the figure.

fasciata.

M. fasciata *Leech* (11 e). Light yellow, forewing with reddish inner margin and numerous black dots and comma-streaks in the basal third. In the median area a dark cell-dot. The outer area is separated from the median area by a black line which is produced outwardly in the centre into a large tooth and into a smaller one under the costa. In the outer portion of both wings black vein-streaks; forewing with black dots at the outer margin. From the Omei-shan in Western China.

linga.

M. linga *Moore* (= tripartita *Walk.*) (11 e). Comparatively large, one of the largest species of the genus. Straw-coloured, thorax with black dots, end of abdomen orange. A few basal spots on the forewing, two rows of dots through the centre, and one before the marginal portion black; the veins accentuated by black streaks in the outer area. In the Himalayas, from Kashmir to Sikkim.

gratiosa.

M. gratiosa *Deless.* Extraordinarily variable in size, colouring and markings, so that it is difficult to find two specimens exactly alike. The largest specimens are by far the largest *Miltochrista*, and those with strongest markings also the most beautiful. There are innumerable transitions between the different varieties, which are only sometimes geographical. True *gratiosa* comes from India; it is represented by the large form figured 11 e (after Delessert). Here the forewing is deep rose-red with yellow reticulations,

rows of black dots and tinged with violet before the marginal area; hindwing and abdomen light carmine-
mactans. pink. — In the smaller **mactans** *Butl.*, described from Darjiling, but also occurring more northward, the
yellow reticulation is much reduced, and the very deep red ground-colour predominates considerably. —
pretiosa. In **pretiosa** *Moore* (11 f), from Kashmir, the yellow is less reduced, the red colour as well as the violet
tinge in the marginal area being less extended; on the other hand, the black median rows are covered
with silvery bands, running transversely across the forewing. — *flammealis Moore* is a large non-Pale-
arctic form from the Eastern Himalayas. — *defecta Walk.* described from Nepal, is also not known from
striata. the Palearctic region. — **striata** *Brem. & Grey*, however, inhabits North China: it has mere dots or dashes
instead of the brownish stripes, and the yellow reticulation predominates over the red ground-colour,
pulchra. which is much reduced. — **pulchra** *Butl.* is a rather small but very brightly coloured form from Japan,
in which the red is very deep and bright, but the black dots of the transverse lines of the forewing are
pulcherrima. almost obsolete. — **pulcherrima** *Stgr.*, from the Amur, is also very bright red, but not constantly different
from the other East Asiatic forms, and connected by a complete chain of transitions with the North
Chinese and Japanese forms. — Some other forms of the species (*lanceolata, lucibilis*), do not reach the
Palearctic region. The entire species has an immense area of distribution: from Amurland southward to
the Malay Archipelago, and from Kashmir and Western Anterior India over Ceylon throughout South
Asia to China and Japan. The moths do not seem to be rare, but to occur singly like most *Miltochrista*.

decussata. **M. decussata** *Moore* (11 d). One of the most inconspicuous species; dull straw-coloured, often slightly tinged with brown in places. A few small dark dots at the base; others in the disc, being remnants of the central transverse line; the outer line strongly and deeply dentate; marginal area with black vein-streaks. East China.

M. delineata Walk. (= rhodina *H.-Schäff.*). The original form not Palearctic. This is orange, forewing with black basal dots. The inner transverse line of the forewing twice elbowed, the middle one slightly incurved, the outer one originating at the same spot as the middle one, and excurved below the discal spot; in the outer area dark vein-streaks. In the hindwing there are also dark vein-streaks in the
fuscescens. apical region. South-East Asia. The form **fuscescens** *Butl.* (= chinensis *Fldr.*) has the base of the forewing darkened; northward to the Yang-tse-kiang.

calamina. **M. calamina** *Butl.* (= lutea *Stgr.*) (11 d). Larger than *decussata*, brighter and purer yellow, otherwise similar; the anterior and middle transverse lines of the forewing slightly more distinct, approximating each other in the middle, the outer line very strongly dentate. In Amurland, locally abundant, e. g. at Nikolaievsk; at the Ussuri; in Japan on the North, Main and South Islands.

rufa. **M. rufa** *Leech* (11 c). Hampson has separated this very peculiar species from this genus, and united it as genus *Heliosia* with 3 yellow forms inhabiting the Papuan and Malayan countries. Both wings rose-red, the forewing being darker, and both have a broad black band before the margin; the forewing moreover is sooty in the basal third. Occurs in Central China, and has probably little to do with the other forms which Hampson places in his genus *Heliosia*.

12. Genus: **Nudina** *Stgr.*

This genus is based on a small species from Eastern Asia, which Staudinger separated from *Miltochrista*. The insect is a transition from the latter to *Paidia*. It is a small yellow moth, with slightly pectinate antenna, rounded forewing and very large, broad hindwing. Tongue strong, long, palpi short, upturned before the frons, which they just reach. Nothing is known of the early stages.

artaxidia. **N. artaxidia** *Butl.* (= nubilosa *Stgr.*) (11 f). Straw-coloured, hindwing lighter; in the outer half of the forewing a grey sinuous cloud; on the hindwing of the ♂ a darker shadowy band before the margin. In Amurland, near Vladivostock, and at the Ussuri; according to Leech in Corea; also in Japan, where Fenton found it near Tokio, and Pryer on the Ohoyama.

13. Genus: **Apaidia** *H.-Schäff.*

This genus consists of two small grey South European species. Head small; frons not very broad, not narrowed below; palpi short, obliquely upturned; tongue developed. Antenna of ♂ ciliate, of ♀ very thin. Thorax and abdomen very thin, somewhat resembling those of certain *Tineidae* in facies; abdomen just reaching the anal angle. Forewing slightly elongate, pointed in *rufeola*, more rounded in *mesogona*; hindwing large and broad. The larva densely hairy, on bark, into which they eat.

mesogona. **A. mesogona** *Godt.* (11 f). Brownish ashy grey; through the middle of the forewing a shadowy line runs from the costa and another from the inner margin, which sometimes merge together and form a continuous line. In Southern France and on the Iberian Peninsula. Larva brown, light yellow dorsally, densely hairy, with a lateral line composed of black spots, until May on the trunks of cork-oaks, on lichens.

rufeola. **A. rufeola** *Ramb.* (11 f). Larger than the preceding, the forewing longer and more pointed, light ashy grey, with reddish sheen, the dots in the median portion variable, sometimes merged together to form a strongly elbowed transverse line. In Italy (Northern Italy, Rome), and in Corsica.

14. Genus: **Nudaridia** *Hamps.*

Two small moths from the Amur form this genus; they were formerly placed with *Nudaria*, but differ strongly from it in the antennae and venation. The very broad and rather short wings are so strongly rounded that the apical angle of the forewing entirely disappears.

muscula. **N. muscula** *Stgr.* (11 h). Dark brown, slightly transparent, forewing with a few dentate lines before and behind the centre, and a distinct discal dot. Near Chabarovsk and Vladivostock, in the Sutchan district, in July.

ochracea. **N. ochracea** *Brem.* (11 h). Quite similar to the preceding in size and shape, yellowish brown, the ♀ lighter, pale ochre-yellow. The transverse lines before and beyond the discal spot on the forewing obsolescent, and scarcely recognisable in worn specimens (from which Bremer's figure was taken). At the mouth of the Ema, at the Chingan and Ussuri, probably distributed throughout Amurland, in July.

15. Genus: **Paidia** *Hbn.*

This genus only contains one species, which cannot, however, be placed in any of the genera now known. It is most closely allied to *Nudaria*, but also shows some affinity to *Endrosia*, and in Hampson's classification stands between *Apaidia* and *Asura*. Head moderately large; frons broad above, smoothly scaled, without long tuft of hair. Tongue aborted. Palpi porrect, about as long as the head. Thorax with short hair, abdomen dorsally with longer hair. Forewing unusually broad and rounded, with strongly overhanging apical portion in the ♂. Hindwing scarcely broader than the forewing, outer margin slightly incurved in the centre. Larva with long tufts of hair, on lichens of walls and stones; the moths in crevices of rocks and stones.

murina. *albescens.* *conjuncta.* *cinerascens.* **P. murina** *Hbn.* (= vestita *Hbn.*, nica *Frr.*) (11 f). Light brownish, hindwing lighter, both wings slightly transparent, hindwing more so than the forewing. A small dot in the middle of the cell and another at its apex dark; two feeble shadows extend from the costa and a few shadowy dots from the inner margin of the forewing. Hindwing without markings. Throughout Central and South Europe, but very sporadical and local. — **albescens** *Stgr.* is a larger, more witish, form from Syria. — In the smaller and darker **conjuncta** *Stgr.* the shadowy dots on the forewing merge together and form lines. Mesopotamia. — In **cinerascens** *H.-Schäff.* (11 f) the ground-colour is more sooty ashy grey than brown, and the markings also merge together to dark shadowy transverse lines; from Asia Minor. — Larva pale grey, with small, grey, laterally light-hairy warts, and two subdorsal lines composed of sulphur-yellow separate spots. Until May on lichens on walls, sometimes in large numbers under the top-slabs of walls; often absent in large districts, and at their localities frequently confined to certain walls or stones. In July.

16. Genus: **Lyclene** *Moore.*

Hardly 8 Asiatic species of this genus, which is composed of 100 mostly tropical forms, reach the Palearctic region. In facies they strongly resemble *Miltochrista*, and unite this genus with several others which are separated from the old genus *Setina*, viz.: *Philea*, *Cybosia* and *Endrosa*. In their habits and facies these Palearctic species do not differ at all from *Miltochrista*. The insects are met with singly on flowers, or are accidentally found when beating the branches of blossoming trees.

Head broad, depressed; eyes moderately large; tongue strong; palpi very short, not reaching the frons, with vestigial end-segment. Antennae long, setiform, in the ♂ sometimes uni- or bi-pectinate or finely serrate, the teeth being always short in these latter cases. Thorax thin, short, as a rule with smooth hairs. Legs thin, tibiae with short spurs. Abdomen slender, sometimes extending beyond the anal angle, sometimes not reaching it. Forewing triangular, fairly broad, never lanceolate or linear as in *Lithosia*: hindwing considerably shorter, oval, usually without markings. In *Lyclene* many of the characteristics of markings and colouring of *Miltochrista* are repeated, generally on a smaller scale, rose-red and pale yellow being predominant. — Little is known as yet of the larvae; that of *L. lutara Moore*, according to the figure, appears to be very stout with scanty hairs. Pupa in an ovate cocoon.

griseata. **L. griseata** *Leech* (11 g). The largest Palearctic form; forewing grey with a few irregular dark dots near the base, a dark spot in the apex of the cell, and a W-shaped flexuose row of spots before the margin. Hindwing slightly yellowish, darker near the apex. From West China.

carnea. **L. carnea** *Pouj.* (= rubricans *Leech*) (11 g). Almost as large as *griseata*, but forewing dull yellowish grey with a strong wine-red tinge. Only very few of the dots of the basal and marginal rows are present, but a dark transverse band runs from the middle of the costa to the inner part of the inner margin. West and Central China, especially at the Yang-tse-kiang.

nigrivena. **L. nigrivena** *Leech* (11 g). Not unlike the preceding in shape, size and colouring; the forewing, however, has no distinct transverse band, but in the outer third a row of comma-shaped dashes of varying length, partly situated along the veins. West China.

unipuncta. **L. unipuncta** *Leech* (11 g). Still larger than the preceding, forewing predominantly orange: distinguished by the large black spot standing quite isolated at the apex of the cell. Central and Western China.

megala. **L. megala** *Hamps.* (11 g). Size and shape of the preceding, but much lighter, more ochreous above: there is a row of dots before the margin as well as the dot at the apex of the cell. From Pekin; closely resembles some *Miltochrista*, e. g. *M. pallida Brem.*

infumata. **L. infumata** *Fldr.* (= pallida *Moore*) (11 g). Forewing of ♂ pale orange, outer half shaded with darker colour, hindwing sooty grey black with orange-yellow outer margin. Forewing with cell-dot and a row of dots before the margin. On the hindwing there is also a black discal spot, which is, however, concealed by the black suffusion. In lighter specimens, in which the colour of the hindwing is often considerably lighter, the discal spot is also distinctly visible on the upper side; such specimens belong to ab. *postica.* **postica** *Moore.* Kashmir, also in other districts of the Himalayas. This form also is similar to certain *Miltochrista*, e. g. *M. sanguinea Moore.*

dharma. **L. dharma** *Leech* (= butleri *Leech*) (11 g). Pale yellow, resembling a very small *L. megala*, but both the cell-dots and the dots in the submarginal row very small, and another row of similar, scarcely visible dots between the base and centre. Widely distributed, found in Kashmir and Southern Japan, and *calamaria.* occurs probably also in most of the interjacent countries, e. g. West and East China. — Perhaps **L. calamaria** *Moore* (= punctata *Elw.*, celipoda *Meyr.*), which extends far to the south and has dark spots also on the thorax, is only a variety of *dharma* (Hampson).

modesta. **L. modesta** *Leech* (11 h). Considerably larger than the preceding forms, about intermediate between *dharma* and *megala*; likewise ochreous; the cell-spot in the forewing very large and distinct, the row of submarginal dots also distinct though irregular. A number of other black dots on thorax and at the base of wing, and a dot in the middle of the cell below the costa. From North-West China.

strigipennis. **L. strigipennis** *H.-Schäff.* This very variable moth is sometimes more, sometimes less streaked and dotted with black, and inhabits especially tropical India (Sunda-Archipelago, Sikkim, Formosa) in the forms *terminata Moore, discistriga Moore, fruhstorferi Auriv.*; it touches the Palearctic region at Shanghai. Specimens from there are ivory-yellow, sometimes ochreous, and mostly dark pink at the anterior and outer margins; besides various black dots the forewing bears a row of dark streaks or hooks in the outer area.

congerens. **L. congerens** *Fldr.* (= arctocarpi *Moore* (11 h). Much less conspicuous than the preceding forms; pale yellow, all the spots on the forewing produced to form parallel, comma-shaped dashes; the dots in the apex of the cell and at the base of the forewing also form short streaks. Widely distributed in the Himalayas, from Kashmir to Sikkim.

rubricosa. **L. rubricosa** *Moore* (= curvifascia *Hamps.*). As large as *congerens*; instead of the rows of short streaks there are three continuous bands, the basal and marginal bands being wavy, but the central one oblique and straight. The ground-colour of both wings is carmine pink, but pale orange yellow specimens *ochreacea.* also occur; these are ab. **ochreacea** *Hamps.* Kashmir; also distributed over Anterior India to Ceylon.

undulosa. **L. undulosa** *Walk.* (= straminea *Walk.*, excurrens *Walk.*, decurrens *Walk.*). By far the smallest Palearctic species of this genus, scarcely more than half the size of *congerens.* Pale yellow, forewing finely and densely dotted in the whole basal half as well as before the margin. Moreover, a very fine sinuous line traverses the forewing before the outer third. An Indian moth, only reaching the Palearctic region in the Kangra district, Kashmir.

17. Genus: **Asura** *Walk.*

This genus s. str. has little more than a dozen species, and is distributed over the tropics of the Old World, a few forms occurring even on isolated and outlying islands, such as the Louisiades, Tenimber and Tasmania. An Australian species, *A. cervicalis,* is regarded as the typical form. It is black-brown with ochreous spots, having the same pattern and colouring as numerous Syntomids which fly together with it, though this similarity cannot be called mimetic. The ♂♂ of most species differ from those of the preceding genus in the antennae being rather strongly pectinated. The moths resemble *Miltochrista* in habits and appearance, but the yellow ground-colour is predominant.

umbrifera. **A. umbrifera** *Hamps.* (11 h). Dull brownish ochreous; forewing so strongly dusted with cinnamon-brown that the transverse lines crossing it are obscured. Hindwing light grey-brown. From Yatung in Tibet.

nubifascia. **A. nubifascia** *Walk.* (11 h). Size of the preceding, but the forewing and hindwing pale yellow, with lines of dots in the basal and median areas. The dark dusting is confined to the marginal area, where *simplicifascia.* it forms three dark teeth reaching nearly to the outer margin. In ab. **simplicifascia** *Elw.* the two rows of *homogena.* dots forming the central band are farther apart. In ab. **homogena** *nom. nov.*, which Hampson describes without naming it, the markings of the forewing are obsolete. From Kashmir over Tibet to the Eastern Himalayas, from where the species was originally described.

A. dasara *Moore* (♀ = chromatica *Swinh.*) (11 h). Considerably smaller than the preceding, pale yellow, the forewing of the ♂ with distinct transverse lines before and behind the centre, which approach each other or merge together below the cell; hindwing also light yellow, slightly paler. In the ♀ the transverse bands less distinct, but a dot in the apex of the cell of the forewing, which is usually obsolete in the ♂, is more prominent. This spot is also very distinct in a ♂ which I caught near Hillgrow in the Nilghiris. Distributed from Kashmir over India to the Malay Archipelago, and locally not rare. *dasara.*

18. Genus: **Philea** *Z.*

This genus has often been united with the following genera *Cybosia* and *Endrosa*, but the insects belonging to it are very delicate as compared with the robust *Endrosa*. They inhabit generally grassy embankments and alpine meadows, but are not confined to the mountains as are the *Endrosa*. When caught they obstinately feign death, and the ♀♀ sometimes do not fly away even when thrown into the air. The wings then hang down with the undersides touching one another. The sexes differ greatly in size. Frons fairly broad, palpi short, porrect, tongue absent, eyes large, antenna of ♂ serrate. Thorax and frons smoothly scaled, legs thin, tibiae with moderately long spurs; abdomen with dense, smoth, slightly metallic scaling, not pilose as in *Endrosa*; wings sparsely covered with very thin scales, hindwing with black disc below. Larvae with fairly long black hairs, dark brown with light rows of spots, on lichens on stones; pupa dark reddish brown, in a thin cocoon. Only one very widely distributed species.

P. irrorella *Cl.* (= flavonigropunctata *Retz.*, irrorea *Schiff.*, irrorata *Godt.*) (11 i). Light yellow, *irrorella.* 3 transverse lines of minute black dots traverse the forewing, hindwing mostly with only one dot in the apex. Beneath, the forewing is glossy sooty grey with the exception of a rather irregular yellow outer margin. Distributed throughout Europe with the exception of the extreme North and South, and from England and Western France throughout Northern Asia to the Pacific Ocean. Among typical specimens there are found various aberrations, e. g. ab. **signata** *Borkh.*, in which the middle rows of spots are united by streaks; ab. **fumosa** *signata. fumosa.* *Sandb.*, with strongly brownish ground-colour, described from the North, but also found in Germany. — The species also varies strongly geographically: **flavicans** *Bdv.*, from the Mediterranean and Anterior Asia, *flavicans.* has brighter deep yellow wings and the apex of the abdomen yellow. — **nickerli** *Rebel* (= signata *Z.*) *nickerli.* is paler yellow, the forewing slightly dulled with the exception of the clearer yellow inner margin; from the Alps and Northern Europe. This form is often found in collections as *freyeri*. — True **freyeri** *Nick.* *freyeri.* (11 i) is, however, according to Rebel, the much smaller insect from the highest Alps, in which the dots of the central rows sometimes merge together. The black basal spot of the forewing mentioned by Staudinger-Rebel is unessential, and the pale yellow colour is found in *nickerli* as well as *freyeri*. — **andereggi** *H.-Schäff.* (11 i) has the veins of the forewing dark, appearing like rays; from the high Alps, *andereggi.* and in the higher North. — **riffelensis** *Fell.* (11 i, k) is considerably smaller, the ground-colour slightly *riffelensis.* dulled, the black vein-streaks more numerous, especially the costa and median veins strongly sooty black. In the high Alps, especially abundant above Zermatt; can be obtained by beating the juniper-bushes around the hotels at Riffelalp. — **lata** *Christ.*, larger, with broader wings, paler, with very few markings *lata.* hindwing often quite without markings; from Russia over North Siberia to Kamtschatka. — **insignata** *Stgr.*, *insignata.* quite similar to the preceding, but with narrower wings; forewing also with very few dots, and hindwing without any; East Siberia. — Larva black-brown, reddish grey laterally, with black hairs intermixed with reddish brown ones placed on small glossy black warts. Dorsally a row of bright yellow spots, often contiguous, subdorsally dull yellow ones, and yellow spots laterally. On lichens of stones, until June. Pupa blackish brown. Moth in July and August, in grassy spots, resting closely appressed to a stalk or branch, with the wings strongly slanting in roof-shape. When disturbed they either drop down into the grass, or only fly a few yards. Common in suitable localities wherever they occur; the ♀♀ must be searched for more diligently, as they fly less, but they are also not rare.

19. Genus: **Cybosia** *Hbn.*

This genus also contains only one known species. Slender like *Philea*, but with larger and broader wings, especially the hindwing being considerably broader. Tongue present, but reduced. Palpi and eyes as in the preceding genus, but the antenna setiform; the frons with slightly rough hairs, not so smoothly scaled. The ♀♀ not so much smaller than the ♂♂. Larva stout, black-brown, more densely hairy, but not so brightly spotted as that of *Philea*; on lichens and especially on Hepaties.

C. mesomella *L.* (= eborea *Esp.*, eborina *Hbn.*) (11 k). Forewing pale ivory yellow. A dark dot *mesomella.* below the costa, and another above the inner margin. Hindwing grey, fringes yellow. North and Central Europe, excepting the extreme North, also in Anterior Asia and Siberia. Larva dark grey with deep black head and nuchal plate; hairs blackish. Until May on lichens on the ground, especially Jungermanniaceae. Pupa black, in a cocoon covered with lichens. Moth in June and July, not rare, but occurring more singly than the preceding species.

20. Genus: **Endrosa** *Hbn.*

Much more strongly built than the preceding genera. Medium sized, but robust, yellow moths, with aborted tongue; the palpi are also reduced, and quite hidden in the shaggy hairs of the head. Antennae of ♂♂ finely ciliate. Thorax and end of abdomen more strongly hairy; on the side of the thorax beneath there is a small bladder-like organ with which the moths are said to make a slight clicking noise when they are flying about in the sun-shine. The larvae are stout, cylindrical, with tufts of hair, and like the allied genera live on lichens; they hibernate, and pupate in a light cocoon intermixed with their hairs, the pupa being stumpy and immobile. The moths rest with the wings folded flat in roof-shape; most of them occur in mountainous regions.

roscida. **E. roscida** *Schiff.* (11 k). Resembling *Philea irrorella,* rather small, pale yellow, unicolourous, with
few markings, abdomen black, only the end-segment yellow. In Central Europe and Anterior Asia. —
melanomos. **melanomos** *Nick.* (11 k) is a form from the high Alps, which is said to occur also in similar specimens in
Scandinavia; still smaller than true *roscida,* upperside of wings strongly suffused with sooty in patches,
sometimes the ground-colour altogether suffused with black; tegulae with erect hairs. The dots on the
forewing are often united by several blackish rays on the veins. — Larva black-brown, densely checkered
with yellowish. Dorsal line yellow, ill-defined. On lichens on the ground and on stones, where one must
search for them in the early morning before they crawl away in the crevices of stones. Pupa stumpy,
ochreous, in a whitish cocoon; the moths in June and July, on dry stony slopes, where they are seen
flying in a straight line when the sun shines, or are found at rest on rocks.

kuhlweini. **E. kuhlweini** *Hbn.* (11 k, l). Bright pale orange yellow, the dark dots large and distinct, usually
longitudinally oval, most numerous in the row before the outer margin. The forewing below is suffused
with black. In typical specimens the abdomen is entirely orange-yellow, or banded with black, while in
compluta. ab. **compluta** *Hbn.* it is black with the exception of the tip. In North-Eastern Germany and the coun-
alpestris. tries around the Baltic. — **alpestris** *Z.* is the southern form, occurring in the Alps of Switzerland and the
Tyrol, as well as in South-East Europe, Asia Minor and Armenia; considerably larger, abdomen strongly
ringed with black, antenna of ♂ thicker. — Larva black with yellow dorsal line, strong yellow irroration,
which forms an interrupted stripe above the legs. Hairs black above, mixed with grey laterally; underside
lighter grey-brown. Like the preceding until May on lichens. The moths more abundant only in the Alps,
local and more singly in the plains.

aurita. **E. aurita** *Sulz.* (11 l). Bright pale orange yellow. Forewing with rows of thick black dots, which
stand closer together before the margin. Underside of forewing not suffused with black, hindwing the
same colour as forewing, not lighter as in *kuhlweini.* Thorax black, with a yellow spot in the middle in
true *aurita.* Abdomen black, often with the sides, a number of bands and the apex yellow, or entirely
yellow with the exception of the base. The true *aurita* is only known from the southern Alps, especially
ramosa. from the Vallais. — In **ramosa** *F.* (11 l), which represents the species in the higher Alps (e. g. at Zermatt,
but also in other ranges of the Alps at the same altitude), the dots of the forewing are united by sooty
transiens. black vein-streaks, so that mostly only the marginal dots remain isolated. — ab. **transiens** *Stgr.* (11 l) is a
transition to *ramosa* in which the dots of the wings are only partially united by slight rays; already at a
imbuta. lower altitude in the southern Alps. A further transition is ab. **imbuta** *Hbn.* (11 l), in which these rays
pallens. are continued inwards to the base. — **pallens** *Mill.* (11 l) is a pale yellow form, often also slightly smaller,
which occurs at the highest altitudes, near the snow-line; I found it for instance as the only form on the
sagittata. Gorner Grat, where it was abundant. — ab. **sagittata** *Rätz.,* from the south-side of the Simplon, is a deep
yellow form with strong marginal spots. — Moreover, localities are known in which a coffee-brown form
occurs frequently or almost exclusively, e. g. at certain places in the Upper Engadine; this form was first
observed in abundance by Catherine and kindly sent to me for description in this work, but was
fumosa. meanwhile also discovered by Heydemann and described as ab. **fumosa** (11 l). — Larva blackish brown,
with rhombiform spots dorsally, and irregular light yellow ones laterally; similar yellow dots are arranged
in rows in place of subdorsal lines. The larvae of the high alpine forms are darker with blacker hairs
and smaller yellow dots. — *aurita* with all its forms has as yet only been found in the Alps and neigh-
bouring ranges, an area of distribution so much restricted being rare among Lithosiids. But there the
moths are common from the end of June to the autumn, and during nearly the whole period of flight one
finds worn and fresh specimens. The ♂♂ are mostly seen when they fly slowly across the valleys in a
straight line with a slight clicking noise, often at a considerable height above the ground. In the early
morning the ♀♀ may be forced to fly by kicking against young larch trees, or they can be caught when
they rise with a clumsy flight into the air from the stony slopes.

21. Genus: **Chionaema** *H.-Schäff.*

These small Lithosiids, better known under Walker's name of *Bizone,* are among the most pleasing of all the smaller Heterocera. They are usually snowy white with simple blood-red transverse lines on the forewing, and it is this simplicity of colouring which makes them so charming. Scarcely any species can be described as common. Like *Miltochrista* they are nearly always met with resting singly on a leaf or flower, or they may be beaten out of bushes. Altogether about 80 forms are known, which are distributed over Southern and Central Asia and tropical Africa. A very few species extend northward as far as southern Siberia and southward to Australia.

Head large, frons scutiform, longer than broad, slightly narrower below, very smoothly scaled, white. Eyes large, somewhat oval, slightly convex. Palpi porrect, seldom upturned, short. Tongue strong. Thorax robust, moderately convex, often marked with red or yellow on a white ground. Tibiae with moderate spurs. Abdomen cylindrical, narrow, sometimes pointed, nearly always of the same colour as the hindwing. Forewing fairly elongate, often broad from the base, in the ♂ frequently with a lammellate fold on the underside beyond the middle of the costa, from which a tuft of hair originates on the upperside. Hindwing broad and large, the middle of the distal margin often excurved. — Larvae, as far as they are known, cylindrical, with small round head and long dense tufts of bristles standing on rather large warts; on lichens. Pupae very smooth, rounded, pointed behind, immobile, in an ovate, very loose, reticulate cocoon made of hairs. The moths fly at night, but when disturbed also in day-time, or rest on flowers. In the temperate regions they occur in the summer, in only one brood, but in the tropics are met with singly all through the year, being most abundant in tropical India from January to April, this depending, however, on the locality.

C. puella *Drury* (nec *Moore*) (12 a). Forewing with 4 narrow scarlet transverse lines, that placed *puella.* before the centre projecting basad with a strong tooth, the one behind the centre proximally convex, being curved distad at the costal and inner margins. Three distinct black central spots in the cell in the ♂, and one in the ♀. Hindwing tinged with a delicate rose-red. In Kashmir (Kulu, Dalhousie, Kangra); also in other Himalayan districts (Nepal) and distributed over South India to Ceylon, mostly not rare, but singly.

C. hamata *Walk.* (= emergens *Walk.*) (12 a). The only Japanese *Chioanema* besides the southern, *hamata.* non-Palearctic, *unipuncta*. Very closely allied to *puella*, and united with it by Matsumura; more robust than *puella* from Kashmir, the red transverse bands thicker, the one behind the middle angulate at the apex of the cell, and running in a convex curve to the inner angle, where it meets the terminal band in the ♀. Distributed throughout Japan, from Hokkaido to the Linchotes; also in the opposite districts of China, from Shanghai to Hongkong, probably also in the interior, but always singly and often rare.

C. sanguinea *Motch.* A narrow red stripe runs from the basal transverse line, which is often *sanguinea.* vestigial, to the inner red line traversing the forewing before the centre. The outer red line is also connected with the terminal one by a streak at the costal margin and at the inner angle. The hindwing bright pink, especially in the marginal area. The scent-organ at the centre of the costa inconspicuous. — In ab. **cruenta** *Leech* (= dubenskii *Alph.*) (12 a) the red transverse lines are very narrow. In North and *cruenta.* Central China, as well as on Formosa.

C. alba *Moore* (12 a). White, the forewing tinged with rose-red at the base, costa and before the *alba.* margin, with a black discal spot; hindwing also suffused with rose-red towards the apex. Sometimes the whole apical area of both wings is strongly rose-red, and the underside of the forewing blackish. North and Central China and Corea.

C. sikkimensis *Elw.* (12 a). This Indian form from the Himalayas is distributed northward to Tibet *sikkimensis.* (Yatung). It is at once recognised by the transverse bands placed before and beyond the centre being dull orange-yellow instead of red, while the terminal band is absent. The thorax is also marked with ochreous; the hindwing is pure white.

C. adelina *Stgr.* (12 a). Like the preceding without terminal band on the forewing, but the bands *adelina.* before and beyond the centre rather coarsely dentate, and together with the shortened basal band and the edge of the tegulae bright scarlet, not ochreous as in the preceding. In Amurland, at Vladivostock and at the Ussuri. — A small and strongly differing ♂ described by Staudinger from North China (Macrolep. Amur-Geb. No. 308) probably belongs to the following species.

C. pratti *Elw.* (12 c). Smaller, with broader wings, the ♂ with a strong tuft of hair beyond the *pratti.* middle of the costa. The postmedian line is quite or almost obsolete between the apex of the cell and the costa; a red terminal line is present, but reaches neither the costal nor the inner margin. Hindwing in the ♂ very bright pink, and the underside also strongly tinged with pink. North and Central China, near Pekin, in Shantung, at Ningpo and at the Yang-tse-kiang, locally not rare. In July.

C. ariadne *Elw.* (12 c). The transverse lines very broad, blood-red, the one before the centre with *ariadne.* a tooth projecting towards the base; a broad red smear before the margin; ♂ with three black discal dots; hindwing less brightly rose-red than in *pratti*. At the Yang-tse-kiang.

C. adita *Moore* (= bifasciata *Pouj.*, walkeri *Elw.*) (12 b). Forewing pure white, the red terminal *adita.* band absent, and there are at the most slight traces of the basal band. The two central transverse lines very narrow and light red. Both sexes with two or three discal dots; the ♂ with a very strong tuft of hair beyond the middle of the costa. In Kashmir, Tibet, also widely distributed in the Himalayas.

fasciola. **C. fasciola** *Elw.* Smaller, the terminal band very broad, almost touching the broad outer transverse line at the inner margin; from the inner transverse band of the ♂ a process projects distad in the cell; ♂ with 2 or 3, ♀ with one discal spot. Hindwing bright pink, especially in the ♀. At the Yang-tse-kiang, near I-chang, Chang-yang.

guttifera. **C. guttifera** *Walk.* (= triguttata *Walk.*) (12 c). All 4 transverse lines present, but quite obsolescent and orange-yellow. Kashmir and other Himalayan countries; also distributed over Anterior India to the Andamans. The species agrees in the yellow colour of the lines with *C. dohertyi Elw.* from the North-Western Himalayas.

bellissima. **C. bellissima** *Moore* (12 b). The most beautiful Lithosiid, of the size of *O. quadra.* Forewing white, with three discal dots, and broad blood-red transverse lines at the base, before and beyond the centre of the forewing. In the ♂ the whole outer area of the forewing suffused with orange-yellow, in the ♀ a yellow band before the margin. Hindwing and abdomen a beautiful carmine-pink, darker in the ♂ than in the ♀. Underside in ♂ entirely carmine, in ♀ white with dark central spots, and the hindwing tinged with pink. Widely distributed in the Himalayas, especially in the West. Locally not rare. In Indian specimens the band before the margin is sometimes also red instead of yellow.

interrogationis. **C. interrogationis** *Pouj.* (12 c). Scarcely half as large as the preceding: the band before the margin likewise yellow, being broad and diffuse in the ♂; the central and basal bands also bright yellow; hindwing in the ♂ very bright rose-pink. In the ♀ the bands of the forewing are more reddish. Known from North India and Shanghai.

phaedra. **C. phaedra** *Leech.* This species is easily recognised by the submarginal band of the forewing terminating costally in a large spot, so that the outer transverse band and the submarginal band are connected, the basal and antemedian bands also being connected. Three black dots in the disc of the forewing. In typical specimens the transverse bands are dark blood-red; but specimens also occur in which *moupinensis.* they are orange: ab. **moupinensis** *Leech.* At the Yang-tse-kiang, from the estuary to Sze-chuen.

gazella. **C. gazella** *Moore* (12 c). All transverse bands of the forewing dull orange, and all connected with one another; between the two central bands one to three spots, also orange; hindwing and abdomen white or light grey. In Kashmir, also distributed over the Himalayas as far as Sikkim.

gelida. **C. gelida** *Walk.* (12 c). On the forewing the white ground-colour is entirely superceded by ochreous-brown, the whole median area excepting the costal portion being occupied by dull yellow-brown clouds. A sooty brown smear extends through the cell almost to the outer margin; hindwing yellow-brown. In the Himalayas, from Kashmir to Sikkim.

detrita. **C. detrita** *Walk.* (= suffundens *Walk.*) (12 a). Thorax and forewing everywhere with irregular grey-brown cloudy spots, between which there are light bands and stripes. Only in the disc there are 3 black dot-like spots, the one at the apex of the cell having a whitish centre. Hindwing in the ♂ white, in the ♀ slightly dulled with grey. In the Himalayas, from Kashmir to Sikkim, but also in other mountain-ranges of India.

22. Genus: **Agrisius** *Walk.*

This peculiar genus seems to unite true Lithosias on the one hand with *Miltochrista* and on the other with the Nyctemerids or Hypsids. In contradistinction to the last described forms, *Agrisius* has long, somewhat upturned palpi, especially the end-segment, which in the Hypsids is strongly porrect in the shape of a stylet, being remarkably long. *Agrisius* has a moderately broad head, well developed tongue, fili- or setiform antennae. Thorax strong, broad, smoothly scaled, spotted. Forewing broad, dotted in the basal area, distally with streaks on the veins. This scheme of markings strongly recalls *Hypsinae.* Only 2 forms are known, one from Eastern Asia and the other from the Himalayas. Nothing is known to me of the habits, as I have never found a moth of this genus in nature.

fulginosus. **A. fulginosus** *Moore* (= japonicus *Leech*) (12 d). Sooty grey-brown, body and basal half of forewing with black dots. In Japan (more definite localities are not recorded), as well as China, and said to occur also in India.

23. Genus: **Paraona** *Moore.*

Very closely allied to the following genus, but the wings shorter, the body more robust, intermediate between *Lithosia* and *Agylla* in general appearance. Head broad, eyes small, widely separated by the frons, palpi fairly short, antenna setiform. Thorax broad, the collar brightly coloured and sometimes with a metallic gloss. Abdomen of the ♂♂ slender, clothed with rough hair. Forewing more triangular, not so elongate as in *Lithosia*, the hindwing also not so long as in the following genus. Sexes similar. Three species, one of them Palearctic.

P. staudingeri *Alph.* (12 d). Sooty grey-brown with sulphur-yellow collar; forewing and thorax darker than the hindwing and abdomen; both wings with dark veins. Sze-chuen. *staudingeri.*

24. Genus: **Oenistis** *Hbn.*

Formerly *quadra* was placed in *Gnophria* together with *rubricollis*, but stands now widely separated from it. Hampson unites it with only one other species, *subcosteola*, in his genus *Lithosia*, so that all the long-winged species hitherto known as *Lithosia*, have to be removed from that genus, as they are not related to *quadra*. But as the genus contains numerous species and hence is very characteristic of the subfamily, we prefer to retain Fabricius's name *Lithosia* for it, and therefore follow Staudinger-Rebel (Cat. Pal. Lep. p. 377) in removing *quadra* from it.

Head moderately large, frons slightly convex, not narrowed below. Eyes fairly large; palpi short, erect; tongue stong; antennae setiform, not more than half the length of forewing. Thorax stout, smoothly hairy. Abdomen smooth, a tuft of hair dorsally on segments 2 and 3. Legs with metallic blue scales; tibiae with short stout spurs. Forewing very elongated, broad at the base; hindwing very long with fairly pointed apex. Sexes dissimilar. Larvae with longitudinal stripes, thinly covered with strong hairs; by day they rest full length in the crevices of tree-trunks, and live on lichens, but when these are scarce also feed on leaves of trees or even needles. The pupa is stout, very smooth, as if polished, in a very loose cocoon in crevices of bark. The moths appear after 3 or 4 weeks; they are very abundant in some years and then again very scarce for a long time.

One often sees the moths flying by day; they have normally only one brood.

O. quadra *L.* (12 d). The ♂ of the Large Footman is much smaller than the ♀, brown-grey with a leaden gloss, thorax and base of wings golden yellow, costa metallic blue-green at the base. The ♀ yellow, the forewing with a black-blue spot behind the centre of the costa and above the inner margin. — The Japaneses form, **dives** *Butl.*, is said to have darker ♂♂; but the comparison of a large number of specimens proves that this difference is not constant; the ♂ figured on plate 12 d is an authentic Japanese specimen which I myself caught near Yokohama, specimens similar in all details occurring in Europe. The European specimens vary considerably, the ♀♀ with regard to the size and the ♂♂ in the colouring. In exceptional cases one of the dots (ab. *unipuncta Spul.*) or both (ab. *impunctata Spul.*) may be absent in the ♀, or replaced by a transverse band (ab. *fasciata Spul.*, *confluens Dumont*). The area of distribution extends over almost the whole of Europe and Northern Asia, from Scandinavia and Livonia to the Mediterranean, and from the Atlantic coasts to Amurland, Corea and Japan. A specimen from Sikkim which Hampson mentions is exactly similar to the ♀ of *quadra*, except for an anomaly in venation; otherwise *O. quadra* is to be regarded as an exclusively Palearctic species. — Larva slate-grey, with thin longitudinal lines, a transverse black spot each across the back anteriorly, in the centre and behind, and subdorsally there are longitudinal rows of small reddish yellow warts; until June of lichens on trees, walls and stones. When the species becomes over-abundant a scarcety of food results; the larvae then attack the leaves and needles of trees, and may become injurious. Pupa black, with a porcelain-gloss, stumpy and immobile. The moth appears in July or August; in the south of the area there is occasionally a second brood. *quadra.* *dives.*

O. nigricosta *Leech* (nec *Hampson*) (12 f). We here unite in the same genus with *quadra* a species which is treated by Hampson as a separate genus (*Conilepia*) and really stands rather isolated. Half the size of a ♀ of *quadra*, forewing with dark costa but without the black dots of *quadra*-♀. The type, a ♂, is said to have come from Japan. *nigricosta.*

25. Genus: **Apistosia** *Hbn.*

This genus consists of 6 species, of which the 5 Exotics, mostly American species, differ considerably from the preceding genus, while the only Palearctic form, which touches our area in West China, is very closely allied to *O. quadra*. Head broad, frons broad, separating the moderately large eyes. Tongue developed. Palpi upturned, reaching nearly to the vertex. Antenna uni- or bipectinate. Thorax very smoothly scaled, abdomen laterally with hairy warts. A few foreign species have the remarkable habit of resting with the hindwings projecting posteriorly beyond the forewings.

A. subnigra *Leech* (12 e). Similar to a small ♀ of *O. quadra*, yellow with 2 dots on the forewing, which is relatively broader. From Wa-shan in Western China. *subnigra.*

26. Genus: **Agylla** *Walk.*

This genus is already closely allied to true *Lithosia*. The palpi mostly project only half as far as those of *Apistosia*; head smaller, frons flat, antennae long, often with fairly long pectinations. Thorax almost globular; tibiae with moderate spurs; abdomen clothed with rough hair. The forewing of the Palearctic species elongate, linear, but lanceolate in some Exotics, and too small in comparison with the huge hindwing; in the ♂♂ sometime with patches of hair. Over 50 species are placed in this genus, which were formerly scattered over many genera, and are distributed over both hemispheres. The greater number of species inhabit the Andes, a smaller number the Himalayas.

sinensis. **A. sinensis** *Leech* (12 e). Recalling *O. quadra* in colour and markings, light yellow with 2 black dots on the forewing, but the spots only half as large and the upper one not at the costa, but below it in the cell. In West China.

prasina. **A. prasina** *Moore*. This remarkable moth, from Kashmir, slightly resembles Hypsids, especially *Macrobrochis gigas*, which is much more extended black. Size of ♀ of *O. quadra*, body and wings white, but with strong metallic blue markings, the forewing being shaded from the margins inwards, and traversed by the dark glossy metallic blue veins, while the hindwing is white with a grey-black apex. Kangra, Dalhousie, distributed in the Indian Himalayas to Sikkim.

vittata. **A. vittata** *Leech* (12 f). The species is well characterised by the yellow longitudinal stripe which traverses the dark blue-grey forewing; costa and collar are also pale yellow, as well as the hindwing. In this longitudinal band of the forewing the moth resembles a group of Indian species belonging to the following genus. North China; the form does not appear to be common.

albifinis. **A. albifinis** *Walk.* (12 f). Dark grey-brown, a large disc-shaped spot at the apex of the forewing, and a narrower band at the apex of the hindwing white. Not rare in the whole of the Western Himalayas from Kashmir far into the Indian territory. In the eastern Himalayas the species is represented by a similar moth, *apicalis Moore*, with more intense colouring, which does not, however, reach the Palearctic region.

pallens. **A. pallens** *Hamps.* (12 f). This moth, which is unknown to me in nature, is among the largest species, and has a very broad lanceolate-rotundate forewing. The colouring is very remarkable: abdomen and hindwing are sooty grey, but the forewing light ivory with dark costal stripe, the colouring being reversed as compared with that of most of the following species, which have a dark forewing with light costa. In the North-Western Himalayas to Kashmir.

gigantea. **A. gigantea** *Oberth.* (12 a). Almost as large as the ♂ of *O. quadra*; both wings uniformly iron-grey, slightly tinged with yellowish red; the forewing has a bright yellow costal stripe extending as far as the apex. Singly in Amurland, on Askold and in Japan, caught in July at the lamp by Graeser.

collitoides. **A. collitoides** *Butl.* (12 e). Larger and darker than *gigantea*, forewing glossy black-grey, the costal stripe broader and lighter; the collar bright orange. In Amurland (Hampson), as well as especially Japan. I only caught the moth once, near Yokohama, at the end of July; it does not appear to be common.

postfusca. **A. postfusca** *Hamps.* (12 e). Like a small form of the preceding, being described as such. The costal stripe narrows towards the apex, where it almost disappears. Kashmir and Tibet, probably also on Indian territory.

holochrea. **A. holochrea** *Hamps.* Pale ochreous; tips of palpi, antenna, femoral stripes, tibiae and tarsi dark brown; underside of forewing suffused with brown with the exception of the marginal area. Chang-Yang.

27. Genus: **Chrysorabdia** *Butl.*

Four species, which are allied to *Agylla vittata* with regard to colour and markings, have been separated from the preceding genus on account of peculiarities in the venation. All the species have the forewing longitudinally striped. Two species are Indian, two Palearctic.

bivitta. **C. bivitta** *Walk.* (= disjuncta *Moore*) (12 f). As large as *O. quadra*; the light yellow colour predominates on the forewing, the dark metallic glossy dark blue longitudinal stripes being obsolescent in the disc and only distinct in the outer marginal area. The costal streak is broader in the ♀ than in the ♂. Kashmir, widely distributed in the Himalayas, also on Indian territory.

alpina.

C. alpina *Hamps.* (12 g). The figure (from Hampson) shows that the dark bands of the forewing are more complete than in the preceding species, only the upper one being obsolete before the outer margin. Costal area of forewing suffused with sooty. Yatung in Tibet, at an altitude of 10 000 feet.

28. Genus: **Lithosia** *F.*

This genus with its over 120 forms might be separated into over 20 genera, if all the divisions proposed by Moore and Walker could be considered valid. But the Palearctic forms, about 60 including the varieties, can be arranged quite naturally in one genus if the group of species is accepted in Hampson's sense, who dealt with it under Hübner's name of *Ilema* (*Eilema*). — *Lithosia* is especially characterised by the very long linear forewings, and the broad hindwings, which latter are generally folded in a very complicated fashion when the insect is at rest. All 4 wings are kept close together and one over the other, so that when at rest they extend far beyond the relatively short abdomen, but project only slightly laterally. The proboscis is well developed, as in the preceding genus; head broad, with especially broad vertex and large prominent eyes; palpi very short and rather rough-hairy below, with the apical segment quite vestigial; antennae of ♂ variable, setiform or with very small teeth or delicately plumose; thorax short, abdomen very stout, wich a very stumpy apex in the ♀, very rough-hairy in the ♂. Forewing broadened directly behind the base, with the costal and inner margins almost parallel, hindwing generally slightly incurved below the apex. — Larvae moderately hairy, usually with longer hairs at both ends and often with coloured warts or knobs; on lichens. Pupae, as far as they are known, dark, glossy, with stumpy tail-end, in a loose cocoon. The moths appear in the summer, and rest in daytime in the foliage of bushes, or on stalks or twigs, with the wings folded; they are easily flushed, and then fly for short distances in a straight line, settling again on branches close by, usually on the underside of leaves. In dull weather they often drop down into the grass, where they can easily conceal themselves on account of their slender build. The representatives of this genus are mostly found at the southern boundary of the Palearctic region, but some other districts are also rich in species, e. g. the island of Madagascar. No species is known from America.

lurida.

L. basinota Moore. One of the largest species of the genus. True *basinota* inhabits the Indian Himalayas, but in Palearctic Kashmir occurs also a form, **lurida** *Butl.* (12 g). Like the Indian race it has dark violet-brown thorax and forewing, and the head, collar and a spot at the base of the inner margin of the forewing yellowish grey; the disc of the hindwing, however, is paler yellow than in specimens from Sikkim, being only slightly brownish at the margin; the hindwing of the Palearctic form, moreover, has the base bright yellow. Kashmir, on the southern slopes, Kangra, Dalhousie.

deplana.
ochreola.
helveola.
luteola.
pavescens.

L. deplana *Esp.* (= depressa *Esp.*, luteola *Hbn.*) (12 g). Both wings dark brown-grey, with the costa of the forewing and the fringes light bright yellow, especially in the ♀. The ground-colour is often more or less lightened with ochreous, sometimes almost clay-colour (**ochreola** *Hbn.*), or nearly whitish (**helveola** *O.* = helvola *Hbn.*), or of an indefinite intermediate shade (**luteola** *Hbn.*). In **pavescens** *Butl.*, from Hokkaido (Island of Yezo), the wings are dirty greyish yellow; the hindwing lighter in the abdominal region. — From Scandinavia and Northern Russia; found also eastward in Japan (form *pavescens*), but specimens are not known to me from Amurland or Central Asia. — Larva dirty lead-grey, bearing a yellow dorsal stripe with dark edges and 3 raised black transverse spots anteriorly, posteriorly and in the centre, and black markings laterally. Until June, on lichens on trees. Pupa glossy red-brown. The moths singly but not rare, in July and the beginning of August, may especially be beaten from young conifers.

griseola.
flava.
vetusta.
aegrota.

L. griseola *Hbn.* (12 g, h). In typical specimens of this form, which is distributed over the greater part of the globe, the forewing is very glossy, silky, light lead-grey, with pale sulphur-yellow costal margin, which is, however, narrowed at the middle of the costa and only extends to the apex as a very fine line. Hindwing pale yellowish grey, uniform in the ♀, slightly darker marginally in the ♂. At once distinguished from the preceding species by the underside (12 h) on which the sulphur-yellow hindwing and abdomen contrast sharply with the ash-grey forewing and thorax. Central Europe, especially not rare in Germany, northward to Finland, southward to Northern Italy, westward to the Atlantic coasts, eastward to Anterior Asia. — In Great Britain a form occurs which is analogous to the form *ochreola* of *deplana*, with the forewing yellow above; this is **flava** *Haw.* (= stramineola *Dbl.*). — In the East the species varies considerably. In Amurland it is much smaller, and the ground-colour of the forewing is so light that the costal stripe only slightly contrasts with it; this is **vetusta** *Walk.* (= amurensis *Stgr.*). — **aegrota** *Butl.* (= adaucta *Butl.*, cinerea *Pouj.*, lenta *Leech*) (12 h), on the other hand, is larger than European *griseola*, and the forewing darker, the hindwing, which is yellow above, contrasting sharply with it; from Japan. — This moth also occurs outside the Palearctic region, e. g. as *lilacina Moore* and *fuscicilia Hamps.* in India, *serva Walk.* in the Malay Archipelago (and Japan?) and *subumbrata* in West Africa. — Larva black-grey, with reddish yellow spots behind the head, from segment 3 backwards two reddish yellow longitudinal stripes dorsally, between which there is a black dorsal line. Until the beginning of June, on lichens on trees. Pupa glossy reddish brown, in a cocoon of moss or lichen. The moths in July and August, often common in Central Europe and in Amurland, on tree-trunks and the branches of suckers.

bipuncta. **L. bipuncta** *Hbn.* (= colon *Möschl.*) (12 h). Similar to *griseola* in size and colouring, in the colour of the forewing resembling especially *flava*, but before the costa and above the inner margin there is a black dot as in the ♀ of *quadra*. A few specimens caught in South-Europe (Italy, Spain). Otherwise in Ethiopian Africa (Cape Colony, Natal), perhaps also in India.

japonica. **L. japonica** *Leech* (12 h). Much smaller than *griscola*, but similar, only more brightly coloured; forewing more strongly rounded. Japan.

muscula. **L. muscula** *Stgr.* (12 h). Still smaller than the preceding, almost like a dull-coloured *sororcula*, the costal stripe light yellow, but not contrasting greatly with the light greyish yellow ground-colour. The forewing below is dark grey with narrow light yellowish brown costal marginal stripe, and broader greyish yellow outer marginal area; the hindwing beneath light yellowish or whitish grey, darker at the costal margin. Somewhat variable specimens from Beirut, the Taurus and the Lebanon.

coreana. **L. coreana** *Leech* (= arideola *Fixs.*) (12 h). This form is closely allied to the preceding, but is already a transition from it to *lurideola*, of which it might be a small form. Head, neck and shoulders and the costal stripe of the dirty grey-brown forewing bright yellow, Hindwing light yellow, more or less suffused with brownish. From Amurland, North China, Japan, and Corea.

urideola. **L. lurideola** *Zinck.* (= complanula *Bdv.*, plumbeola *H.-Schäff.*) (12 i). Forewing broadened towards the outer margin, bright glossy lead-grey with broad, regular, light yellow costal band, somewhat dulled at the apex, and pure yellow fringes; hindwing, head and neck and anal tuft of ♂ ivory yellow. Beneath, the forewing is only suffused with sooty grey at the base and on the disc., so that a broad outer border is pale yellow. Hindwing pale yellow with a slightly dark costal margin. Throughout Europe with the exception of the extreme North and South, also in Asia Minor, up to 10 000 feet in the Alps. — Larva dark blue-grey with black dorsal line and black head, bearing black and yellow hairs; subdorsal lines black, stigma-line orange. On lichens of trees, hibernating, until the end of May. Pupa reddish brown, glossy. Moth from June to August. According to Schmidt the larvae prefer the trunks of beeches and oaks, but I most often beat the moths out of the lower branches of high, solitary larches in the Alpine valleys; locally very common, especially in the mountains.

debilis. **L. debilis** *Stgr.* (12 i). Head, neck, shoulders and anal tuft bright yellow, thorax and abdomen blackish. Forewing dark iron-grey, with the costal and outer margins pale yellow; hindwing pale ivory, darker at the costal margin. From Irkutsk.

morosina. **L. morosina** *H.-Schäff.* (= costalis *Z.*) (12 i). At once recognised by the thin scaling of the semidiaphanous hindwing. Forewing very narrow, linear, with very pointed apex and inner angle, earth-grey with only slightly contrasting bright yellow costal margin, and a thin yellow line at the inner margin. Hindwing transparent light ivory. Asia Minor.

complana. **L. complana** *L.* (= complanata *Cost.*) (12 i, k). Very like the preceding, but the forewing not so elongate, and the angles not so accentuated, the costal streak broader and brighter yellow, the hindwing duller, not so transparent; the apex of the abdomen brighter yellow. On the underside the disc is very prominently blackish iron-grey, and contrasts vividly with the orange-yellow costa and the broad pale yellow marginal area. Hindwing beneath pale yellow, the costa deeper yellow; below costa a grey streak from the base. Throughout Europe with the exception of the Arctic region, and in Anterior Asia, southward to the Mediterranean and Asia Minor, and eastward to Turkestan. — Larva blackish dorsally, with narrow lighter lines; subdorsal lines composed of small reddish yellow and white spots; lateral line interrupted, reddish yellow. Until June, on lichens; also attacks the foliage of fruit-trees. The moths in July and August, in open places in woods and nurseries.

vikaria. **L. vikaria** *Walk.* (= antica *Walk.*, natara *Moore*, sarawaka *Butl.*, imitans *Mab.*). Very like the preceding, both wings somewhat broader and shorter; the yellow costal stripe often disappears beyond the centre of the costa in the lead-grey ground-colour; otherwise very variable. A moth of tropical countries, not rare in India, on the Malay Islands and in Africa. One specimen is said to have come from the Amur, but this may be due to an error in labelling, as collections made in Amurland are often augmented by the traveller during his stay at Hongkong, where *vikaria* is not rare.

sericea. **L. sericea** *Gregson* (= molybdeola *Guén.*) (12 k). Grey, head and shoulders, end of abdomen, costa of forewing and tips of fringes yellow. Strongly resembling *deplana* in facies, but smaller and more delicate, forewing narrower with straighter outer margin, costal stripe of forewing paler and yellow, sharply defined and of equal width to the apex; hindwing not uniformly grey, but lighter at the base and darker at the apex, the whole ground-colour more iron- than brown-grey. Confined to Great Britain: Cheshire and Lancashire. — Larva blackish grey with short brown hair and black dorsal line; subdorsal line interrupted, orange-red, spotted with white; lateral line black, stigma-line rusty yellow edged with black; head black (Meyrick). Until June on lichens, dead leaves, etc. The moth in July, singly and local.

caniola. **L. caniola** *Hbn.* (= complanoides *Fuchs*) (12 k). Almost the same in colouring as *griseola* and *lurideola*, but the forewing much smaller, the outer margin oblique, only slightly excurved; the colour much lighter, more yellowish grey, so that the pale yellow costal stripe is less prominent. Hindwing very pale, scarsely darker at the costal margin, with the apex much more pointed than in the two species mentioned, with which it might be confounded. At once distinguished from *complana* by the underside of the forewing, on which the pale grey colour extends to the margin, the latter not being broadly yellow as in *complana*. In West and Central Europe, Germany, Switzerland, France, England and Russia; also in Spain, Italy and Sicily. *vitellina.* ab. **vitellina** *Bdr.*, if it is not a lighter variety of another species (which appears to me to be probable, according to the shape of the wing in Biosduval's figure, plate 57, fig. 10 ♀), is a form with the forewing dusted with grey close to the distal margin and of a pale bright yellow ground-colour in the ♂. *albeola.* ab. **albeola** *Hbn.* (= lacteola *Bdr.*) (12 k) is considerably smaller, and, except for the bright yellow thorax, entirely white on the upper side; it occurs among ordinary specimens. — Larva grey or reddish brown with dark dorsal line, red subdorsal lines edged with black and occasionally spotted with white or black; on lichens on stones or walls, but may also be reared on withering lettuce-leaves and the flowers of Lotus corniculatus; until July, when it pupates in the ground according to Fuchs (?); the moth flies in August at the Rhine, but probably considerably earlier in the South.

affineola. **L. affineola** *Brem.* (= calamaria *Moore*) (12 k). Very closely allied to the form *vitellina* of *caniola*, light straw-colour, slightly suffused with blackish at the costa of the forewing and in the costal area of the hindwing, as in *vitellina*, and also on the underside. Widely distributed in Southern Asia, in the Palearctic region in Kashmir, Amurland and Japan. — In Japan and China there also occurs the *aprica.* form **aprica** *Butl.*, which is unknown to me. It strongly resembles *sororcula*, on account of the almost golden yellow ground-colour and the reduction of the black dusting, but is said to differ from that species in the venation and shape of the wings. Undoubtedly the differences between *affineola*, *calamaria* and *aprica* are very insignificant.

costipuncta **L. costipuncta** *Leech* (12 l). Much larger and more robust than the preceding forms, even larger than *deplana*. Bright golden yellow above, with a black spot below the middle of the costa; hindwing with a blackish costal margin. At the Yang-tse-kiang.

suffusa. **L. suffusa** *Leech* (12 k). One of the largest *Lithosia*, as large as the ♀ of *quadra*. Forewing violet-grey, lighter towards the outer margin, with bright yellow costal stripe; hindwing pale yellow. From Sze-chuen.

nigripoda. **L. nigripoda** *Brem.* (= insolita *Walk.*, praecipua *Walk.*) (12 l). As large as the preceding, but the forewing pale straw-colour; dull longitudinal shadows along the subcostal and submedian veins. In the ♀ the ground-colour is deeper bright yellow. In Eastern China and Japan.

moorei. **L. moorei** *Leech* (12 l). As large as the preceding, in the ♂ the dull whitish grey forewing strongly tinged with brown along the veins and in the whole outer third, the costa also narrowly dark brown. In the ♀ the forewing uniformly dark brown dusted with whitish. In the Yang-tse valley, from Ningpo to Sze-chuen.

degenerella. **L. degenerella** *Walk.* (= alba *Moore*, nivosa *Butl.*) (12 l). One of the smallest *Lithosia*, not larger than *sororcula*; forewing pure snow-white, hindwing pale isabella-colour, blackish at the costa, frons, collar and thorax also white. North and East China, Corea and Japan.

unita. **L. unita** *Hbn.* (= gilveola *Bdr.*, palliatella *Hamps.*) (12 l). Both wings fairly uniformly ochreous grey, sometimes with dark shading before the outer margin, and the anal portion of the hindwing as far as the subcostal a shade lighter, more light ivory. In South Germany, Switzerland, Austria-Hungary, in sandy districts. — *arideola.* **arideola** *Her.* (12 l), more in North Europe, Scandinavia, Finland, and North-Eastern Germany, has a broader, bright yellow costal stripe on the grey forewing, and the pale yellow anal half of the hindwing contrasts sharply with the grey costal half. — *vitellina.* **vitellina** *Tr.* is whitish grey, head, shoulder and abdomen beneath bright yellow. Forewing brownish from the base to the middle, the outer half and the fringes orange-yellow, hindwing pale yellow; distributed in Germany, France, probably also elsewhere. — In *flaveola.* **flaveola** *Rambr.* (= petreola *Guén.*) the forewing is light ivory without any dark dusting; Spain. — *palleola.* **palleola** *Hbn.* has also no dark shading or patches; but the ground-colour of the upper side is pale straw-yellow; in the south of the area. — *arundineola.* **arundineola** *Guén.* is a transition from *palleola* to *vitellina*, likewise more in the South. — *gilveola.* **gilveola** *O.* (= beckeri *Guén.*) is a smaller form; forewing pale straw-colour, somewhat darker towards the outer margin; hindwing ivory; Austria-Hungary. — Perhaps *cinereola.* **cinereola** *Hbn.*, with light grey forewing, also belongs here. There is therefore in Europe from North to South a complete gradation, the grey of the Finnish and North-East German *arideola* changing to light grey straw-colour and whitish, from Germany, Austria, France, Italy to Spain. Usually only one or two forms are found in one locality, but in the interjacent districts, especially in South Germany and Austria, the forms of the neighbouring districts occur as aberrations beside the normal form of that district. The same is the case in Anterior Asia, true *unita* occurring in Ferghana, and further south, in Armenia, the lighter *palleola*. — Larva dark

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[1] Cf. Ochsenheimer, Schmett. Eur. III, p. 137, foot note.

grey-brown, hairs black-brown, some of the longer bristles white; dorsal, lateral, and subdorsal lines black; above the dark lateral lines rows of small white spots; on the back yellow-brown spots. Head brown with 2 white dots. On lichens, withering leaves and flowers, until July. The moth in July and August, not rare in sandy districts.

flavociliata. **L. flavociliata** *Led.* (= ochraceola *Brem.*) (12 l). Head, thorax and abdomen, forewing and fringes of hindwing bright yellow; hindwing blackish grey, slightly tinged with yellow towards the base. In East Asia, westward to the Altai. — In specimens from the Amur the forewing is sometimes strongly suffused *infuscata.* with sooty in the outer area, which greatly alters the general appearance of the insect; this is ab. **infuscata** *Stgr.* — In every case *flavociliata* has the hindwing beneath grey with yellow fringes, differing in this from all other *Lithosia*.

lutarella. **L. lutarella** *L.* (= lutea *F.*, luteola *Schiff.*, lutosa *Esp.*) (13 a). Forewing light golden yellow, hindwing the same; but the costal margin of the latter suffused with blackish grey, sometimes to the middle of the wing, sometimes only narrowly. The underside is very characteristic, the forewing being dark blackish grey, with pale yellow margins, and the golden yellow hindwing bearing blackish grey basal streaks in the costal area. Throughout Europe and North Asia, from Scandinavia to the Mediterranean and from the *nigrocincta.* Atlantic coasts over Central Asia to Amurland. In ab. **nigrocincta** *Spr.*, described from the „Mainzer Sand", the forewing is distally narrowly edged with black. — Larva dark grey-brown with brown hairs and black dorsal line; subdorsal lines brown, stigma-line white, edged with yellow above. Until June, on lichens. The moths are on the wing in July and August; they vary very strongly, especially in the amount of black on the hindwing. They usually rest in day-time on stalks or on branches of gorse, looking like bits of straw, but one also finds them sucking at flowers in the sunshine. In most districts of Central Europe this and *sororcula* are the commonest Lithosiids.

pallifrons. **L. pallifrons** *Z.* (= vitellina *Bdv.* pt.) (13 a). Very like the preceding, and by many authors considered a hardly separable aberration of *lutarella*. Frons and ground-colour of forewing paler, not blackish, the costal margin of the very narrow forewing said to be more curved. Forewing above often slightly dusted with blackish. On the underside the entire forewing and the costal half of the hindwing are suffused with blackish; in the latter there is a small but always distinct pale yellow central lunule. Europe, *marcida.* from the North Sea coasts to the Mediterranean and from France to Greece; also in Armenia. — **marcida** *Mann* (13 b), from the Mediterranean coasts of Europe, Asia and Mauretania (which I also found on the southern slopes of the Atlas Mts.) is pale greyish yellow, almost like a form of *unita* in colour, but of a different shape; the costal region of the hindwing is only slightly and more uniformly dulled with grey, *nancola.* and the margins of the forewing are often narrower and paler yellow. The second, smaller, brood is *pygmaeola.* **naneola** *Ragusa*. — **pygmaeola** *Dbl.*, perhaps a separate species, from Southern England and the opposite coast of Holland, is a small form, light straw-colour, the forewing with the exception of the costal area more or less suffused with dark. — Specimens from Marasch have light ivory forewing and in the ♂ pale orange-yellow, in the ♀ ivory hindwing with a black grey patch below the costa: in honour of Herr Bang-*banghaasi.* Haas, who sent it to me, I call it **banghaasi** *form. nov.* (13 a). — Larva black-brown with dark broad dorsal line and black subdorsal lines; on the back yellow-brown spots; stigma-line yellowish. Until June on lichens on stones. Rarer than the preceding.

sordidula. **L. sordidula** *Rambr.* (13 a) is a small form from Andalusia with glossy silvery-white forewing, and is not identical with *marcida*; head and anal tuft bright golden yellow.

sororcula. **L. sororcula** *Hufn.* (= aureola *Hbn.*) (13 b, c). Forewing with the costa strongly convex and therefore the apical portion of the forewing considerably broader than in the forms of the *lutarella*-group. Head, thorax, end of abdomen and the forewing bright golden yellow, the hindwing of ♂ but little paler: in the ♀ both wings slightly paler orange-yellow. In contradistinction to *lutarella*, the costal area of the hindwing above and beneath is never black. From England, Scandinavia and Denmark to Spain and Dalmatia, from North Russia to Turkey, and from France to Asia Minor and Armenia. — Larva blackish (according to Hampson whitish or yellowish), with 2 yellow dorsal stripes with red dots and white spots; until June on lichens on trees, both on conifers (Ochsenheimer) and on deciduous trees (Spuler). Moth in June and July, common almost everywhere; can be obtained by beating saplings, also in bushes and in the grass, sometimes sucking at flowers in the daytime.

cribrata. **L. cribrata** *Stgr.* (13 b). Very like the preceding species in shape, larger, orange-yellow, not golden yellow, and not glossy. The tegulae with a black dot. Forewing with the exception of the outer margin with small but distinct and partially dense black dots. Distributed in East Asia: Amurland, North and Central China, Corea, Askold, and in Japan on the North, Main and South islands.

cereola. **L. cereola** *Hbn.* (= cinereola *Z.*) (13 b). Similar to the preceding, but lighter, orange-yellow, and of quite a different shape. The costa of the forewing straight, not noticeably excurved near the apex, the

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[1]) A monographic revision of this species based on a considerable amount of material would throw more light on this question and is much to be desired.

outer margin therefore much longer; the outer margin of the hindwing slightly incurved below the apex. Beneath, the forewing in the ♂ dulled with pale grey, with orange costal and broad bright yellow outer margin. The ♀ is half the size of the ♂. In North Europe and the Alps. — Egg rose-red. Larva reddish grey-brown, lighter laterally; two light yellow dorsal lines; stigma-line yellow; until June on lichens on stones. Pupa brownish yellow, glossy. The moth in July and August, on damp meadows.

albicosta. **L. albicosta** *Rog.* (13 c). One of the smallest species, most closely allied to the Andalusian *sordidula*; silvery grey, forewing with a glossy white costal stripe. From the Canaries; the specimen before me is dated October; according to Rebel others were caught in August. Püngeler possesses similar specimens from April.

atratula. **L. atratula** *Ev.* (13 c). Black, with the shoulders and end of abdomen orange; a bright yellow costal streak on the forewing; on the hindwing the costa also narrowly yellow, this streak being covered by the forewing. From the Kentei Mts. (Dauria).

fumidisca. **L. fumidisca** *Hamps.* (13 c). Forewing dark violet grey, costal and outer margins orange-yellow; hindwing yellowish grey. Cannot be confused with any other species. An Indian moth, which, however, has also been caught at Sikawei near Shanghai, in East China, and by Korb in Amurland.

nigripars. **L. nigripars** *Walk.* (= pallens *Moore*). As large as the ♂ of *quadra*; both wings uniformly ivory, fringes and margins orange-yellow. In the ♂ the costa of the forewing is thinly black at the base. Beneath, the forewing and the costal area of the hindwing are suffused with sooty. Kashmir.

conformis. **L. conformis** *Walk.* (= nigrifrons *Moore*, laevis *Butl.*) (13 c). As large as the preceding, and with similar colouring, but the outer margin of both wings orange-yellow, that of the forewing sometimes very dark. Kashmir, distributed throughout the Indian Himalayas, as far as Japan.

tetragona. **L. tetragona.** Two forms are known of this species, which is distributed over nearly the whole of South Asia, but is usually not abundant; one form (*tenuisigna Moore*) is not Palearctic; the forewing bears on a pure ivory yellow ground a greenish-black square spot, scarcely extending beyond the median area, and a small dot-like costal marginal spot before the last costal third. — In the Palearctic form, *sordida.* **sordida** *Butl.* (13 d), the blackish green inner marginal spot occupies the greater part of the forewing, and the costal spot of *tenuisigna* is so much enlarged in *sordida* that they nearly or actually touch one another. At the same time the ivory hindwing is dulled with grey in its outer area. North India and China, northward to Fu-chow.

signata. **L. signata** *Walk.* (13 d). This species also occurs in 2 forms. In true *signata* the inner marginal spot is round, and sometimes slightly reduced, this being the case in ab. *brevimacula.* **brevimacula** *Alph.* In the other form, *directa.* **directa** *Leech*, it is larger than in the figure, and somewhat elongate, so that the species slightly resembles the preceding. North China.

fimbriata. **L. fimbriata** *Leech* (13 d). Bright reddish brown above. Thorax and forewing intermixed with grey, dark cloudy markings at the inner margin of the latter. The base of the costa broadly white, this colour surrounding a triangular dark costal spot; the costal margin itself angulate before the last costal third. Hindwing dirty brown-grey, apical area and margin darker. Central China.

reticulata. **L. reticulata** *Moore* (13 c). Forewing yellowish grey, dusted with scattered black scales; through the middle of the forewing a diffuse rust-brown stripe elbowed behind the lower angle of the cell. Kashmir; also distributed over the Indian Himalayas.

pallida. **L. pallida** *Moore* (13 c). Forewing dull yellowish grey; before the outer third a transverse band composed of dark raised scales; in the centre a few dark spots, in the ♂ another one on the costa before the centre. Hindwing orange-yellow with broad black veins. Kashmir.

vagesa. **L. vagesa** *Moore.* This moth, distributed in several forms over the whole of Northern, Anterior and Further India, only enters the Palearctic region at the southern frontier of Kashmir. It has about the same shape and size as the ♂ of *quadra*, and is like the ♀ of the latter uniformly golden-yellow in colour, but without markings or dots. The ♂ has, however, a patch of scales below the cell of the forewing and an oval scent-patch on the disc of the hindwing.

costalis. **L. costalis** *Moore* (= fimbriata *Hamps.* nec *Leech*) (13 d). Only half as large as the preceding; the ♀ dirty yellowish brown, almost without markings, only small faint spots being present below the costa; the ♂ has an ochreous stripe below the costa and narrow black streaks in the median area and before the outer margin. Hindwing ochreous, suffused with brown. In South East Asia, especially Further India, northward to China, where the name-typical form occurs.

29. Genus: **Pelosia** *Hbn.*

This exclusively Palearctic genus may be considered an offshoot of *Lithosia*. It consists of 6 or 7 forms, usually grey-brown or straw-yellow in colour, which are distributed over Europe and North Asia. No form extends into North Africa or India.

Head with broad frons, separating the semiglobular eyes. Palpi quite short; antennae of ♂ serrate or ciliate. Tibiae with moderately long spurs. Forewing resembling that of *Lithosia* in shape, with curved costal and slightly convex distal margins. Hindwing broad with very regularly rounded margin with long fringes. Egg globular. Larva only known of one species; it is stout with small head; dorsally rows of hairy warts; it feeds on lichens. The moths are found on damp meadows.

muscerda. **P. muscerda** *Hufn.* (= perlella *F.*, cinerina *Esp.*, pudorina *Esp.*, (13 d). Dull slate-grey, with a gloss like lead-sulphide, forewing white along the costa. A number of black dots are placed across the disc, varying strongly in number and size. Apex of forewing very pointed. North and Central Europe, in bog districts and on damp meadows, locally also found in Southern Europe; occurs also in North and East Asia, in China and Japan. — The egg, according to AURIVILLIUS, yellow, reticulate. Larva black-brown, variegated with reddish grey, and clothed with blackish hairs. Dorsal and subdorsal lines black; lateral line greyish red, interrupted; nuchal shield and anal tergite deep red, interrupted by the dorsal line. On lichens and withering leaves, until June. Moth in July and August, on boggy meadows, sporadical and only locally more abundant; seems to be absent from large districts.

obtusa. *sutschana.* **P. obtusa** *H.-Schäff.* (13 d). Recognisable by the obtuse apex of the forewing: the latter altogether broader, more uniformly brownish grey, usually without distinct discal dots, and never with the light silvery white costal stripe which fresh *muscerda* always bear, being howover often indistinct in old and in worn specimens. Quite sporadical, in North Germany, in Italy, and as **sutschana** *Stgr.* in Amurland. The eastern form is darker, and has sharper black streaks on the forewing. Seems only to occur quite singly. Nothing is known of the early stages, except that the pupa is said to have been found in Mecklenburg in a reed.

noctis. **P. noctis** *Butl.* (= obtrita *Stgr.*) (13 e). Size and shape of the preceding, with which this form is united by HAMPSON. The colouring is essentially darker, deep earth-brown and very glossy; the black discal marks which are often indistinct in *obtusa* are united to form a line, which is excurved and traverses the centre of the forewing. In East Asia, in Japan and Amurland, in July, rare; was caught at the lamp.

angusta. **P. angusta** *Stgr.* (13 e). Scarcely half as large as the preceding, perhaps only a small local or seasonal form. From Amurland and Corea.

ramusola. **P. ramusola** *Stgr.* (= ramulosa *Hamps.*) (13 e). The largest species of the genus, if it really belongs to it. Forewing dull straw-colour, with darker inner margin, light yellowish grey in the ♀, without markings, only tho veins distinct. In Amurland, near Vladivostock, Chabarovsk, and at the Ussuri, not common, in July.

albicosta. **P. albicosta** *Hamps.* ♂ grey brown or dark brown; vertex, legs, apex of abdomen, and venter ochreous-whitish. Forewing with narrow ochreous-white costal band; fringes of both wings ochreous-white. 20 to 26 mm. Japan.

30. Genus: **Gnophria** *Steph.*

In his great work HAMPSON unites the only Palearctic species of this genus with the very different *unifascia*, only known from Sumbava, to form the genus *Atolmis*, which he placed among the *Arctiinae*. We leave it at the end of the *Lithosiinae*, where it forms a kind of transition to the heterogeneous group *Micrarctiinae*, which latter have some characteristica in common with the *Arctiinae* and *Lithosiinae* and others in which they differ from these subfamilies.

Head small, frons less broad than in the other *Lithosiinae*, eyes large, semiglobular, prominent, palpi short, scarcely reaching the middle of the frons; tongue stout, strong; thorax round; legs strong; abdomen slender, with very brightly coloured end-segment; wings of the same shape as in *Lithosia*, only the hindwing shorter in comparison with the forewing. The latter with a so-called areole, which often occurs in the Arctiids. We only place one species, *rubricollis*, in *Gnophria*, and do not include the few American forms which KIRBY placed here with a?

rubricollis. *flavicollis.* **G. rubricollis** *L.* (13 e). Deep dark brown, fresh specimens almost black; collar orange-red, end of abdomen golden yellow. North and Central Europe, southward to the Mediterranean, and in Sicily; also throughout Siberia to Amurland (near Pokrofka); not yet found in Japan. NEUBURGER names Roumanian specimens **flavicollis;** they are less dark brown and with light yellow instead of red collar. — Larva grey, thinly sprinkled with greenish yellow, and with a narrow white dorsal line edged with grey, and dorsally rows of small reddish yellow warts bearing black hairs. Head dark brown, with two whitish curved lines. In autumn on lichens, especially those of old firs. Pupa glossy brownish red, in a loose cocoon. The moth in May and June, locally abundant, but not every year. Sometimes they suck at Scabious in the sunshine, but usually rest in day-time on the long branches of firs overhanging the paths in the woods, where they may be obtained by beating. They do not, however, fall down to the ground but at once fly away and conceal themselves on a similar branch. On the wing they bear a superficial resemblance to the caddis-fly Phryganea striata, which rests at the same time in the same fir-branches, and when disturbed flies off in the same way.

3. Subfamily: **Hypsinae.**

Beside the few forms of the genus *Aganais* and *Hypsa*, which possibly may here and there extend into the Palearctic region in Kashmir, only one species of the group, belonging to the genus *Eligma*, is found in our region. But the classification of this latter genus with the *Hypsinae* is not established with certainty, as HAMPSON places it with the Lithosiids. Altogether the *Hypsinae* comprise 20 genera, with about 120 forms, which are entirely confined to the Old World, viz. to the Indo-Australian and Ethiopian districts, with the single exception of *Eligma narcissus*. Only slightly further south than the Southern Palearctic boundary, in South China and North India, the *Hypsinae* are among the commonest moths; and the boundary of their area of distribution is quite abrupt. On the whole they are large or medium-sized and very brightly coloured moths of the facies of Arctiids, which, though they rest under leaves in day-time, quickly fly away when disturbed. Many *Hypsinae*, e. g. *Hypsa* itself, *Digama*, etc., have a peculiar organ before the anal angle of the forewing, which has the appearance of a bump on the upperside and consists beneath of ridges, and is considered to be an organ of stridulation. The larvae are very sparsely hairy, also often brightly coloured, hardly resembling those of Arctiids, with large, often slightly indented head and very, soft flabby body, so that they, like the larvae of certain Notodontids, easily drop off the food-trees when these are slightly shaken, and only move away very slowly.

31. Genus: **Eligma** *Hbn.*

Head rather small; frons narrow; eyes large; palpi very long, obliquely upturned, especially the third segment long, nail-shaped, with a slight knob at the end; antennae filiform, short; thorax short; legs stout with woolly hairs and metallic dots; hindlegs very long, with strong spurs at the apex of the tibiae. Abdomen long, slightly flattened and truncate at the apex. Forewing very long and narrow, the hind angle so obtuse that the outer and inner margins pass into one another quite gradually. Hindwing with rather irregular outer margin, orange-yellow with black apical area. Larvae also brightly coloured, sparsely hairy, on trees; the pupa in or on the ground.

E. narcissus *Cr.* (13 l). Markings most peculiar; through the forewing runs a white longitudinal streak *narcissus.* which separates the dark olive-green costal from the lighter inner marginal area. It differs from the fairly similar African *hypsoides* in there being no large white spot at the apex of the hindwing, only the fringes being lighter. Larva with yellow and black transverse stripes, on deciduous trees; the moths in two broods, in July and again in October, in North China, not rare; also widely distributed in India, southwards to Malacca and Ceylon.

4. Subfamily: **Micrarctiinae.**

The following genera can no longer be placed with the *Lithosiinae* without constraint. They must, however, be separated from the *Arctiinae* s. str., if the *Callimorphinae*, which are still more closely allied to the *Arctiinae* than are the *Micrarctiinae*, are separated from them, as in HAMPSON's classification. The species placed in the present group are even more closely related to the Callimorphids, to which *Haploa* and *Utetheisa* form a transition.

In facies the moths still resemble Lithosiids, the body of the ♂ being very slender, the forewings elongate with short distal margin, with light, white, ivory or brown ground-colour marked with small dashes or dots. The hindwings are very broad with long outer margin, in the ♂ of *Argina* the anal angle being extended to form a pointed lobe. The larvae are true „woolly bears", being strongly hairy, with stout body and small head, very agile, greedy and polyphagous; but they do not feed on lichens like the Lithosiids. The moths are partially diurnal and often astoundingly abundant at their flight-places, sometimes forming swarms.

32. Genus: **Coscinia** *Hbn.*

Rather small moths, mostly light-coloured, agile and lively. Head moderately large; frons not particularly broad; eyes large, palpi short, porrect; tongue aborted; antennae of ♂ pectinate; thorax small; abdomen slender, long, extending slightly beyond the anal angle. Forewing elongate, narrow, with short, only slightly curved, oblique outer margin. Hindwing broad and large, the outer margin somewhat elbowed obtusely in the centre near the end of the upper median branch. — Larva densely covered with short tufts of very stiff hairs; they hibernate, and grow very slowly. On grasses. They pupate on the ground in an untidy cocoon; the moth appears in midsummer and rests on stalks and twigs, with the hindwings closely folded as in the Lithosiids, and the forewings tightly wrapped round the body, so that it has a linear appearance like the Lithosiids.

striata. **C. striata** *L.* (= grammica *L.*, palladia *Fourc.*) (13 f). Forewing ivory, with narrow black longitudinal stripes; hindwing orange-yellow, with black costa, marginal band and central lunule. The name-typical form occurs throughtout Europe with the exception of the extreme North, and in Northern Asia to Amurland. *pallida.* ab. **pallida** *Butl.* (13 f) are specimens in which the dark stripes on the forewing are more or less obsolescent. — Oberthür names similar specimens from the Pyrenees, in which moreover the colour of the *xanthoptera.* *bipuncta.* forewing is uniformly bright cadmium-orange ab. **xanthoptera.** In **bipuncta** *Stgr.* the forewing is light isabella-colour and has no other markings than two separate black dots at the end of the cross-vein. This lighter colour is usually accompanied by a reduction of the black band of the hindwing. — On the other hand, the band may be unususally broadened, and at the same time the other black markings above *intermedia.* and beneath increased; this is ab. **intermedia** *Spul.* (13 b), which in the increase of the black colour is a *melanoptera.* transition to the following form. ab. **melanoptera** *Brahm* (13 f) has the hindwing quite uniformly black-brown, whereas the light ground-colour of the forewing is still visible as narrow stripes and minute dots. *funerea.* In ab. **funerea** *Ev.* (13 e) both wings and the body are deep black-brown, with the exception of the orange-yellow segmental incisions. — All these aberrations may occur beside typical specimens, though they are not found everywhere and are not equally frequent. A very large form was described by Oberthür *miranda.* from Thibet, **miranda** (13 f), but only from one ♂. In the description (Ét. d'Ent. 19, p. 33) it is not mentioned to which species „*Chelonia miranda*“ bears any affinity. From Moenia in Tibet, caught in July. — Larva blackish grey, with small yellow-brown warts bearing star-shaped tufts of short but thick black-brown hair. Dorsal line of the larvae of true *striata* reddish yellow, in that of *melanoptera* it is said to be dark. Side-line white; head black. From September until May, on grass. On warm days in April, about 4 o'clock in the afternoon, the larva crawls up the stalks and can be seen there from a considerable distance if one lies down on the ground and looks across the grass. Pupa reddish brown, in a whitish cocoon. The moth in July and August, especially abundant in sandy districts; the ♂♂ fly about in the sunshine on grassy spots and like to settle on long stalks and the twigs of young conifers. The dark forms occur in the South and East of the area, transitional forms are met with exceptionally in all localities.

C. cribaria. This very variable species is still more widely distributed than *striata*, also occurring beyond the Mediterranean in Mauretania. The ground-colour is white, but is nearly always dusted with black on the hindwing and occasionally also on the forewing. In almost every form the forewing bears *cribaria.* black markings, which are very variable in size and number. The true **cribaria** *L.* (= cribum *L.*) (13 g) has the forewing white with very numerous black-brown dots arranged in angulate transverse bands, and uniformly black-grey hindwing with white fringes. From England, Scandinavia, and North Russia, south- *punctigera.* ward to South Germany, Austria, France and Switzerland, and eastward to the Ural. — **punctigera** *Frr.* (13 g), from South Germany, France and Switzerland, has the dots of the forewing strongly reduced in both sexes, so that only a few central rows, consisting of fine but sharp dots, are present. — In the form *bifasciata.* **bifasciata** *Rambr.* (13 h), from Corsica, which is regarded as a separate form on account of small differences in the larva, the dots of the forewing are several times connected by longitudinal streaks, so that the moth somewhat resembles *striata*, the insect corresponding to the form *melanoptera*. Abdomen without *candida.* spots. — **candida** *Cr.* (= cribrellum *Esp.*) (13 h) is the often very large form from South Europe, the southern Alps, Italy, North Spain (said to occur singly also in the East). The forewing is entirely silvery-white, sometimes (not always) with two small black dots at the apex of the cell (= *colon Hbn.*), also the *chrysocephala.* hindwing is dirty white in the anal area. — In South Spain and Sicily this form merges into **chrysocephala** *Hbn.* (= coscinia *O.*, candida *H.-Schäff.*, albeola *Hbn.-G.*, inquinata *Rambr.*) (13 h) with golden-yellow head and shoulders and uniformly silvery white forewing. In Mauretania this is the usual form of *cribaria*. — Lately several other forms have been described, which are doubtless very closely allied to *cribaria*, although some of them are considered distinct species. We do not wish to deny their *lybissa.* specific distinctness, but should like to see the opinion confirmed by the early stages. — **lybissa** *Püng.* (= powelli *Oberth.*) (13 i) with white sparsely dotted forewing in the ♀, and yellowish abdomen without *punctata.* spots. — **punctata** *Oberth.* (13 i) with orange-yellow head, grey thorax and wings, the forewing bearing *haroldi.* more abundant black dots arranged as in true *cribaria*, and with yellow, dotted abdomen. ab. **haroldi** *Oberth.* (13 i), which differs from the preceding in the white forewing and is a transition to true *calligans.* *cribaria*; like the preceding from North Africa. — And lastly **calligans** *Tur.*, from the Etna, whose forewing is brownish but still lighter than the hindwing and bears solitary dots, which in their arrangement slightly resemble the Lithosiid *Stigmatophora micans*. — All these last-named forms are fairly small, scarcely half as large as the ♀ of *candida*, and as they are partly caught at unusual times (*calligans* *sibirica.* in October), one might suppose that we have to do with seasonal differences. — Of further varieties, *rippertii.* the Eastern form **sibirica** *Stgr.* must be mentioned, in which the black dots are obsolescent, and **rippertii**

Bdr. (13 h) in which the ground-colour of the forewing is also blackish grey, but in which the dots are quite distinct; from the Pyrenees. — Egg round, golden-yellow. Larva dark grey-brown, reddish yellow laterally, with black and single white hairs on blackish warts. Dorsal line and sometimes also subdorsal lines whitish yellow, the head dark brown. However, the larvae of the different forms are not quite identical, for instance, that of *bifasciata* is lighter yellow laterally, and with reddish hairs on the middle segments. According to Spuler the larvae of those forms which occur in mountainous regions are darker. On grass, also on other low-growing plants, untill the beginning of June, in the higher Alps (Zermatt) until the end of June. Pupa short, stumpy, reddish brown. The moths are on the wing from June until August, according to the position and elevation of the locality. In contradistinction to the preceding species the ♂♂ appear only to fly in day-time when disturbed, otherwise resting on boards, rocks and stalks, with the forewings closely wrapped around the abdomen. They are not so much confined to certain flight-places as *striata*, but are more dispersed; they are not rare, but are entirely absent from some localities within their area of distribution.

33. Genus: **Utetheisa** *Hbn.*

This genus together with *Deiopeia*, which was erected at a later date, contains a few more than a dozen forms, only half of which are, however, good species. They are distributed over all countries which are not too cold, and are usually among the first moths met with on entering a country. Wherever we go ashore, in Italy, Algeria, the Cape, Madagascar, in Sydney or Melbourne, in China, Japan, India, the United States, Brazil, and even on nearly all larger islands, the first moths which are flushed in the grass of the dunes on our approach are the *Utetheisa*. On a journey in African, Asiatic or Australian deserts they are the last Lepidoptera to leave us, and on a sea-voyage they often come to greet us when the boat is still far from the coast.

Head fairly large, with moderately broad, smoothly scaled frons, and large, semiglobular eyes. Palpi short, upturned. Tongue strong. Ciliae of the antennae of the ♂ varying from being quite short to being long. Tibiae with moderate spurs. Forewing elongate, with the costal margin slightly curved towards the apex; ground-colour white, tinged with rosy red or dotted, seldom restricted by black. Hindwing large, white with black margin and often with central lunule. Body graceful and well proportioned, thorax often spotted, abdomen cylindrical. Larva agile, with brighter colouring and finer hairs, than that of *Coscinia*, with dorsal warts and small, spotted head. Pupa in a cocoon on the ground. The moths live in the grass, often only fly for a few paces and in the sunshine suck at flowers, especially clover and Echium. When touched, as in many Arctiids, two drops of an acrid oily liquid, with a slightly burning taste on the tongue, exudes from the thorax.

U. pulchella *L.* (= pulchra *Schiff.*) (13 k). White forewing with black and red spots, hindwing with irregular black distal margin and central lunule. *pulchella.* Head and prothorax orange. Europe, south of a line extending from Central Russia across the Danube countries and South Germany to Central France, almost everywhere, every year and regularly; but also met with singly and by chance far north of this line, being found in England, North Germany to the Baltic, Heligoland, North Russia and Siberia, here and there, often after intervals of years: at Manchester, Frankfurt, Giessen, Hamburg, singly and usually near the railway, probably carried there by the trains. Besides distributed southward throughout South Europe and the whole of Africa, often enormously abundant (Algeria, Egypt), throughout Central and Southern Asia to Japan, the Philippines, Australia to the extreme south; in the west to the Atlantic islands (Madeira, Canaries, Cape-Verde, etc.) and represented in America by closely allied forms. In spite of this enormous area of distribution no geographical races have developed. On the whole, the moths are smaller in the east and in the Southern hemisphere, so that a name **tenuella** *form. nov.* (13 k) might be given to those very small East-Asiatic forms which do not come under Hampson's *pulchelloides*. *tenuella.* On the other hand, certain abberrations occur in most localities, e. g. ab **candida** *Butl.*, which has white forewing without any red and with very little black. *candida.* ab. **pallida** *Spul.* (13 k), which I caught near Giessen, has very pale markings. *pallida.* ab. **melampyga** *Spul.* has the abdomen nearly all black. *melampyga.* ab. **fasciata** *Spul.* (13 k) has the black dots united to form lines. *fasciata.* ab. **semisignata** *Spul.* (13 k) has the black dots confined to the outer marginal portion of the forewing, being absent in the median and basal areas. *semisignata.* In **thyter** *Butl.* they are almost entirely absent. *thyter.* — The larva, like the moth, is so very variable that a general description is almost impossible. In localities where they occur in abundance, as in East and North Africa, I often found quite differently coloured specimens close together. As a rule, the larva is dark grey, lighter (lead grey or light yellowish) dorsally, on the separate segments reddish yellow or yellowish brown transverse bands. The hairs are moderately long, rather thin, black or white; sometimes a white lateral line is present; head light reddish brown, with black markings. The moths rest in the grass on field paths, at railway banks and in dry beds of rivers, often in huge numbers. I found them most abundantly in Egypt at the Nile Canal and in Algeria along certain railway lines. In Kabylia I drove past mountain slopes where *pulchella* flew up before the approaching mail-coach almost like clouds of snow-flakes. I found the moth common even in the hottest summer far into the Lybian desert, as far as there were still traces of vegetation. In East Asia, South China and Japan it was much more rare, and usually in the mountains, on grassy heights. In Australia I caught it on large plains overgrown with Spinifex near Port Adelaide and Melbourne. On Teneriffe, I found *pulchella* immediately at the landing place at Sta. Cruz, on Opuntia, and they were numerous at the drilling-ground, etc. etc. It has been observed that the moths congregate in huge swarms and travel over Gibraltar and South Portugal.

34. Genus: **Argina** *Hbn.*

This genus, placed by Kirby among the Lithosiids, but removed from this family in Hampson's Catalogue, consists of 10 or 12 forms belonging to about 6 species, greatly resembling Arctiids. Head large, with broad, slightly convex frons and large protruding eyes. Palpi short, porrect, with short end-segment; the latter anteriorly truncate, with black tip. Tongue present, but thin, twice the length of the head. Antennae in both sexes with very short ciliae. Thorax, especially in the ♀, much stouter and stronger than in the preceding species. Legs strong, mostly with metallic dots, tibiae with short spurs. Abdomen cylindrical, golden yellow or red, with dorsal and lateral rows of dots. Forewing less elongate, hindwing less widened and in the ♂ with a tooth-like projection at the anal angle. — Larva with tufts of hair, shorter dorsally and longer at both ends, with small head, transverse spots on the back, and light interrupted lateral stripe, on various plants, e. g. Crotalaria obtusifolia (Horsfield). The genus is distributed over all warmer countries of the Old World with he exception of Europe, and is found even on outlying islands. The moths mostly live in the grass, on broad roads, and mountain-slopes; when flushed they go off with a straight and rather sustained flight, and sometimes come to the lamp. They are among the commonest moths of their countries.

cribaria. **A. cribaria** *Clerck* (13 i, k). ♂ dark orange yellow, ♀ lighter; forewing bearing numerous rows of black dots with light edges, hindwing with more isolated black spots, confluent before the apex. In Kashmir, more at lower altitudes of the southern districts; also throughout India and Australia, Indo-China, Madagascar and the Mauritius, in various forms (*pardalina, astrea, dulcis, pylotis*). — Larva with warts bearing short hairs, at the anal end long bristles, dark iron-grey with glossy head, dark dorsal line and brown-red legs; subdorsally the rings are whitish. Pupa light reddish brown, lighter dorsally, thorax and abdomen marked with black dots. The moth in the summer, common on wood-paths, in warm climates throughout the year.

argus. **A. argus** *Koll.* (13 l). Head, thorax and forewing bright greyish red, the forewing bearing numerous light rings and oval spots with black centres, which are all arranged in rows, but stand isolated. Abdomen and hindwing purple-pink, the latter with several black spots varying in size and number. From Kashmir throughout India and the Himalayas to Ceylon and Burma. — Larva similar to that of *cribraria*, also dark grey, lighter dorsally, but with yellow dorsal stripe and broad white interrupted lateral line bordered with red raised dots. Head and legs reddish brown. On Crotalaria and other plants. Pupa more elongate and pointed than that of *cribraria*, light reddish brown, with blackish markings. The moths settle on the underside of leaves, and may be beaten from the bushes overhanging the mountain-paths, but are not nearly as easy to catch as *cribraria*.

35. Genus: **Epimydia** *Stgr.*

Staudinger erected this genus for a single small grey species which has about the appearance of a *Heterogynis*. The head is small, very hairy on frons and palpi, eyes very large, fairly close together; palpi very small, with long hairs; tongue aborted; antenna of ♂ pectinated. Thorax and abdomen slender and delicate, with long but sparse hairs; tibiae with very small spurs. Wings comparatively broad, forewing triangular with long straight costal margin and rounded apex; hindwing moderately broad. The only species inhabits Siberia, and nothing is known about the early stages.

dialampra. **E. dialampra** *Stgr.* (13 i). Head, thorax and antenna as well as the first segments of the abdomen black, the rest of the abdomen orange-yellow. Wings thinly scaled, uniformly smoke-grey, transparent. From the Kentei Mts. in Dauria.

36. Genus: **Pseudosterrha** *Rbl.*

This genus has been proposed for a small species which Oberthür — whose figure we reproduce — treated as a Geometrid following Lucas. According to the specimen which is before me (from Püngeler's collection) the moth does not seem to me to be put in its proper place by Staudinger and Rebel. It may have affinities with the following genus, but would better be placed among the Noctuo-Phalaenids. Body very delicate; head broad; eyes small, widely separated by the broad frons. Forewing with the costa strongly curved behind the base, very pointed, outer margin obliquely truncate; hindwing obtusely triangular, comparatively much smaller than in the preceding genus.

P. oranaria *Luc.* (13 i). Mouse-grey above; forewing dusted with earth-grey; from the apex a dark shadowy band runs to the middle of the inner margin, the disc being slightly yellowish before the latter. The costa shaded with a darker colour. Hindwing above mouse-grey, with scarcely darker discal dot, not easily distinguished. Beneath, both wings lighter grey; forewing in the outer marginal portion with 2 shortened transverse bands, hindwing beyond the centre with a dark simple curved line, and before it a dark discal spot. The ♂ is not inconsiderably larger than the ♀. The species is apparently widely distributed, as its name is derived from Oran in Western Algeria, but has also been found at Bône in the extreme east of Algeria. *oranaria.*

37. Genus: **Kerala** *Moore.*

Following Staudinger and Rebel's catalogue, we interpolate a second species, though its position here does not to us appear to be very natural. The shape, the palpi and the boat-shaped cocoon, all point to a certain affinity with the *Cymbalidae* or *Nolidae*, to which Staudinger would not, however, agree. Formerly the same author placed the moth with the Noctuids, in agreement with a suggestion by Snellen, where it had perhaps best have remained. As its position is at least uncertain, we leave it in the place assigned to it in Staudinger-Rebel's catalogue, where it can at all events be most easily found.

Head large, frons broad, separating the small eyes. Palpi extending far beyond the frons. Tongue strong. Antennae filiform, with exceedingly short ciliae in the ♂. Head and thorax smoothly scaled, the latter broad and short. Legs fairly long, smoothly scaled, hindtibia with 2 pairs of short spurs. Abdomen slender and very short, smoothly hairy, without real anal tuft. Forewing very long and linear with the costa excurved directly behind the base, and the costal and inner margins almost parallel. Hindwing very broad and long, tightly folded, without markings.

K. macroptera *Oberth.* (13 i). About the same shape as *Cymatophora*; forewing light grey, darker at the costa; basal third separated from the rest of the wing by a grey band narrowly edged on both sides with black; a second grey shadowy band before the outer margin. A black comma-shaped spot before the apex of the cell. In Amurland and on Askold, in Mongolia and Western China, in June, on branches of oak. *macroptera.*

38. Genus: **Camptoloma** *Fldr.*

Very remarkable small moths, conspicuously coloured and stoutly built, which are distributed from Eastern Asia to Further India. Head fairly small, somewhat hidden beneath the large dome-shaped thorax. Palpi moderately long, thin, porrect. Antennae setiform in both sexes. Tibiae with long spurs. Forewing triangular, the costa strongly curved near the base. The colour is yellow, the scheme of marking very peculiar. Two species are known: the genotype from Japan and East China, the other, very similar one, from Assam. The position of this genus is doubtful. In structure the moth strongly resembles certain *Liparidae*, especially *Thaumatopoea*, whose systematic position is likewise not yet certain. We may also mention here that according to Pryer the larvae of *Camptoloma* live gregariously in compact nests, which are attached to chestnut trees, on the leaves of which the larvae feed.

C. interiorata *Walk.* (13 l). Forewing bright lemon-yellow, hindwing orange-yellow, end of abdomen red. Forewing with 6 black lines which traverse the wing longitudinally, obliquely and transversely; the wing is orange-red at the inner margin and above the inner angle. Larvae gregariously on chestnut; the nests on the bark. Near Yokohama, not common, also near Shanghai. *interiorata.*

39. Genus: **Tancrea** *Püng.*

This genus only contains one extraordinary species from Central Asia. While the ♀ so closely resembles the ♀ of *Ocnogyna corsica* that it can only be distinguished by the shorter hairs, the ♂, which is slender and has the body pointed, has almost the facies of *Orgyia dubia*, which it also resembles when on the wing. It is distinguished from *Ocnogyna* by the more elongate forewing, the less distinct inner angle and the silky, not woolly, covering of hair. On the first abdominal segment laterally there are beneath two cavities. Antennae of ♂ and legs of both sexes short.

T. pardalina *Püng.* (♂ 14 b, ♀ 16 a). ♂ light bright yellow with black spots. In the anal area of the hindwing 2 dark rays extend from the base. ♀ dirty ochreous, the wing-remnants fawn. From the Ili-river in Turkestan. *pardalina.*

40. Genus: **Ocnogyna** *Led.*

In this genus we unite about 30 forms, which are all Palearctic and are placed by others in the genera *Ocnogyna, Trichosoma* and *Pachylischia.* The most conspicuous characteristic is the abortion of the wings in most ♀♀. Curiously enough, this peculiarity appears again in the Southern Hemisphere in an Arctiid genus of South America. — Head fairly hidden in the thick woolly covering of the thorax, small; frons narrow; eyes small and hidden. Palpi short and with very long bristles. Thorax and abdomen covered with thick wolly hair, thorax of ♂ very broad and large, abdomen of ♂ slender and short. Forewing of ♂ triangular, very often asymmetrical, and frequently distorted, usually with bright-coloured markings and small spots. Hindwing usually with black outer band and median spot. In the ♀ the wings are aborted to a very variable degree: sometimes they still attain half their normal length, sometimes only traces of them are present. The larvae are usually common where they occur, remaining together when young, but dispersing later on. It is advisable to look for the larvae in the spring, before the vegetation begins to grow and conceals the larvae, which are on the ground. They grow rather slowly, and generally remain in the pupal stage for a long time. The ♂♂ fly quickly and wildly, often also in daytime.

corsica. *sardoa.* *albifascia.* *rosacea.*

O. corsica *Rambr.* (14 a). In the ♂ forewing yellow, with black bands and spots, hindwing orange, an apical spot, a median lunule and two wedge-shaped streaks in the anal area from the base black. In the ♀ the body and the wing-remnants are almost yellowish white. Corsica. — In **sardoa** *Stgr.* (14 a), from Sardinia, the hindwing is more pink and more strongly spotted; the wings of the much darker ♀, which are much better developed than in true *corsica,* are also more strongly spotted. — Ia ab. **albifascia** *Const.* the orange bands are replaced by white ones. ab. **rosacea** *Spul.* (14 a) has the hindwing bright purple-pink; the ♀ is quite pale and its wings are as small as in true *corsica,* but with less spots. — Larva reddish brown, with broad black median stripes edged with white, and three dark lateral stripes. The hairs anteriorly and posteriorly black, in the middle foxy red, laterally whitish. In May and June, on grass; pupa dark reddish brown, in an ovate, brown cocoon. Moth from March to May; easy to breed.

pierreti. *gandolphei.* *atlantica.* *mauritanica.* *huguenini.*

O. pierreti *Rambr.* (14 a). Forewing brown, at the costal margin large cream-coloured spots edged with black; a similar smaller spot at the base, and often traces of others in the disc. Hindwing orange yellow, with broad black marginal band. The ♀ altogether without wings, dark, with long legs and stout abdomen. In ab. **gandolphei** *Oberth.* (14 b) the anterior costal spot is absent and the posterior one also sometimes smaller. ab. **atlantica** *Luc.* has all the light spots, but they are smaller. ab. **mauritanica** *Luc.* (14 b) has only traces of spots on the forewing, there being present a very small costal spot and an exceedingly small one near the apex of the cell. In **huguenini** *Oberth.* (14 b) the forewing is quite uniformly brown, ground-colour of hindwing paler yellow, with the black marginal band broader and more continuous. — All the forms occur in East Algeria, except *huguenini,* which inhabits Central and West Algeria, and is often regarded as a separate species; it is at all events the western representative of the East-Algerian *pierreti.* — The larva of *mauritanica* is found in meadows, lying exposed on the ground. It is very brightly coloured, with blue-grey dorsal area, bisected by a light line, the dirty white sides sharply defined. Head black-brown. The hairs are not foxy red, but dark brown, and not so dense as in *baetica.* On low growing plants; it pupates in June. The moths are still rare in collections; with me they emerged in a room without fire in the middle of January.

baetica. *meridionalis.* *obscurior.*

O. baetica *Rambr.* (14 b). Black, fore- and hindwing traversed by a few white flexuose bands, often tinged with red, which run around the apex of the cell in dentate curves. The first describer already figured several forms of the ♂; a smaller one, which I name *baetica typica,* in which the black on the hindwing is augmented, and a larger one in which there is more white on the hindwing. The latter may be the case to a much greater degree than in Rambur's figure, so that the white colour is predominant, at least on the hindwing. This latter form I name ab. **meridionalis** *nom. nov.* (14 b); it is the predominant form in Northern Africa; among a large number of specimen which I bred in Africa, I have not obtained even a single dark one. But the light form also occurs in Europe, so that there can be no question of geographical races. On the other hand the white may be absent, with the exception of a few slight traces; this is the case in ab. **obscurior** *Spul.*, which is represented by Ramlur's fig. 2. The ♀♀ of *baetica* have scarcely visible wing-remnants, and in facies resemble the ♀ of *Orgyia antiqua.* In Spain and North Africa. — Larva very variable, dark brown, sometimes broadly lead-grey dorsally, always with stiff foxy-red hairs above, and stiff whitish grey ones laterally, so that there is a resemblance to a larva of *Rhyp. purpurata,* but the small silvery-white spots of *purpurata* are quite absent in *baetica.* The larvae always remain on the ground like those of *A. hebe,* and must be collected before the grass in the meadows grows long enough to hide them. Locally they are very common, and in the space of a few square rods hundreds may be collected, and reared on lettuce, dandelion, etc. Pupa in a white cocoon, reddish brown, that of the ♀ with stout abdomen and slenderer thorax (the reverse of Rambur's figure). The larvae are full-grown at the end of May. The moths appear at the end of November and December. Common.

herrichi.

O. herrichi *Stgr.* (16 a) is a transition from *baetica* to the following group. Size and shape of *baetica,* but the dark markings in the basal half of the wing strongly reduced, so that the hindwing is quite white with the exception of the marginal band. From the Taurus.

loewii. *armena.* *pallidior.*

O. loewii *Z.* (= clathrata *Led.*) (14 c). Forewing of ♂ with similar markings to *baetica,* but the white bands broader and the spots before them not black but olive-green. Hindwing dirty white with olive spots. Wings of the ♀ reduced to very small remnants. Asia Minor, Syria and Egypt, as well as on Rhodus. — The Armenian form, **armena** *Stgr.* (14 c), is darker, the olive spots on the forewing only leaving light lines, and merging together on the hindwing to form bands. — On the contrary, **pallidior** *Christ.* (14 c), the form from Turkestan, is considerably lighter in colour in consequence of the broadening of the light bands on the forewing and the separation of the dark bands on the hindwing into rows of spots. — Larva black-grey, with dark marmoration and yellowish white dorsal line broadly interrupted from the third segment; laterally rows of yellow-grey oblique spots, which are sometimes indistinct. Hairs dorsally reddish brown, laterally whitish. In April on low-growing plants. Pupa reddish brown, in a cocoon of earth in the ground near the surface. The moth is common and flies in September and October. According to Christoph it is difficult to rear.

zoraida.

O. zoraida *Grasl.* (14 d, e). As large as, but more brightly coloured than, the preceding; thorax and abdomen with dense long hair. Wings dull light pink, forewing with large, black costal spots continued as flexuose bands, which reach to the median vein and its branches; hindwing sparsely spotted. The wings of the ♀ are only developed to half the normal size. In Spain. — Larva velvety black, said to resemble that of *A. testudinaria.* In June and July, on Plantago, Salvia, Taraxacum, and other low-growing plants, in daytime beneath leaves. Pupa reddish brown. Moth emerging the following May.

hemigena.

O. hemigena *Grasl.* (14 d). Smaller and darker than the preceding, standing between *zoraida* and *leprieuri.* Spots of the forewing essentially smaller, only a few small spots on the hindwing. ♀ very like that of *leprieuri,* the spots only sharply defined and complete at the costa. From the Pyrenees. — Larva lead-grey, with broad whitish grey dorsal stripe and black warts bearing dark hairs. In July and August, on low-growing plants. Pupa reddish brown. The moth in May. — *hemigena* and *zoraida* are doubtless representative species, but cannot be regarded as forms of one species, if the widely differing descriptions of the larvae are correct.

parasita. *intermedia.* *nogelli.*

O. parasita *Hbn.* (14 c). The species which is found furthest north. Dark sooty reddish brown, the forewing in the ♂ with black basal rays and small angulate spots, hindwing with dark square spots. ♀ with the wings developed to $^1/_2$ or $^3/_4$, and with dark spots throughout the forewing and at the margin of the hindwing. Hungary and the Danubian countries, South Switzerland and Southern France. — At the Black Sea the form **intermedia** *Stgr.* occurs, which has the basal streaks shorter and the spots smaller, and the hindwing uniformly grey. — **nogelli** *Led.* (14 d), from Lydia, has the forewing entirely without spots, or only slight traces of them. — Larva yellow or brown, with yellow brown hairs, three dark dorsal lines, between which there are dark dots. Stigmata white. In May and June, on low-growing plants, like gentian, nettles, also on grass; pupa reddish brown in a grey cocoon. Moth in the early spring.

leprieuri.

O. leprieuri *Oberth.* (14 d). Thorax dark reddish brown, densely covered with yellow-brown hairs; abdomen dull reddish yellow, with dark dorsal line. Sometimes the yellow hairs give the whole body a golden yellow appearance. Wings sooty reddish brown, rather transparent. When held before a dark background the forewing has a yellow-red costal area in which there are 4 or 5 small costal spots. The ♀ has very short wing-remnants, which are hidden in the woolly covering of the thorax. The costal spots of the ♂ are sometimes scarcely recognisable. In North Algeria. — Larva dark grey-brown, with red hairs in the centre and blackish ones at both ends, so that it superficially resembles the larva of *plantaginis.* It feeds until the beginning of June on low-growing plants, especially on borage, beneath the leaves of which it rests in daytime, and pupates in a white ovate cocoon, the pupa being short, red-brown, with dark markings. The moth does not appear until the following March or April. I have found that the wings of the ♂ also develop when the insect remains on the ground, the wings being kept erect. Locally very common.

pudens.

O. pudens *Luc.* (14 f ♂, 16 a ♂). Greyish red, thorax and forewing more or less tinged with yellowish red. A shadowy line composed of dark spots on the back of the abdomen. Forewing with an abundance of small blackish spots, arranged in three or four transverse lines. Hindwing also spotted with blackish, especially in the apical area, with dark discal streak. ♀ almost exactly like that of *leprieuri,* blackish, woolly. Mauretania and the opposite Andalusia. — Larva dark brown, with blackish brown head thinly marked with white, and black-brown nuchal shield divided by a pale line. Hair black at both ends and reddish in the centre. Dorsal line thin, white.

latreillei. *aurantiaca.*

O. latreillei *Godt.* (14 e). Body shaggy, black, as is also the forewing, the latter traversed by white bands differing much in size. Hindwing dark rose-red, with black marginal band and central spot. ab. **aurantiaca**

Spul. has orange hindwing. — *chinensis.* **chinensis** *Gr.-Grsh.*, from the Chingan Mts. in China, has the head orange-yellow, and the basal area of the forewing entirely black; according to Staudinger & Rebel perhaps a separate species. — Larva grey-brown, with dark hairs, white dorsal and dull subdorsal lines. Nuchal shield and anal tergite black, the former divided by a light line. Until the autumn on low-growing plants; pupa brown, in a brown cocoon, in moss. Moth in March and April, in the mountain regions of Spain. — The wings of the ♀ frequently distorted and reduced.

pretiosa. **O. pretiosa** *Stgr.* (= pomona *Stgr.*) (14 e). Head and thorax with light spots and margins; body in both sexes larger than on our figure, which was taken from papered specimens. Wings very like those of the preceding species in colour, the black of the forewing generally divided into more black spots by the more numerous light bands; hindwing more yellowish red. From Amurland. This species is placed in *Oenogyna* by Hampson; but it would perhaps be better placed with *Micrarctia kindermanni*, of which it is probably only a form.

bellieri. **O. bellieri** *Led.* (16 a). Forewing dirty grey-white or isabella-colour, with four rows of grey-brown transverse markings, which restrict the ground-colour to a great extent; from the Taurus. — In the form *banghaasi.* **banghaasi** *Stgr.* (14 e), from Akbès in the Southern Taurus, there are dark contiguous transverse stripes before the outer margin of the forewing, and the hindwing is tinged with bright rose-red, especially in the anal area. — *berytta.* In **berytta** *Stgr.* (14 e), from Beirut, the wings of the ♂ are entirely tinged with reddish brown, and the bands of the forewing are indistinct. The only specimen of the ♀ of *berytta* which is before me, and from which our figure is taken, is very different from the ♂ of *banghaasi*; and the opinion is quite justifiable that *bellieri*, *banghaasi* and *berytta* are three different species. Very little is known about these moths. They would perhaps be better placed with the following genus.

41. Genus: **Cletis** *Rambr.*

About a dozen rather closely allied species belong here. Head large, but hidden in the wool of the thorax; frons narrow, but covered with long hair; eyes moderately large; palpi short with dense long bristly hair; tongue aborted. Thorax very broad, tegulae with very long hairs in the ♂. Abdomen of ♂ slender, slightly flattened, with shaggy hairs, that of the ♀ stout, covered with almost entirely smooth short hair. Legs smoothly scaled, often with a metallic gloss, hindtibia with 2 pairs of large spurs. Forewing more or less yellowish grey, with dark angular spots. Hindwing light red with black median and marginal spots. — Larvae with short black hairs, light dorsal line and small glossy black head with yellowishmarkings. They prefer sandy districts and have only one brood; their area of distribution embraces Europe and North Asia.

maculosa. **C. maculosa** *Gerning* (14 f). Typical South German specimens of this species described from Frankfurt a. M., — where it has now almost disappeared — are dull grey-brown with dark spots on collar, thorax, tegulae and forewing. The hindwing is purple-red, lighter in the ♂ and darker in the ♀, with black spots, or in rare cases the hindwing yellow (*flava.* ab. **flava** *Spul.*). Transitions, more leather yellow in colour, are *pallida.* ab. **pallida** *Aign.* Typical specimens are only found in Austria-Hungary and in the countries of the lower Danube, besides Southern Germany. But the species varies greatly, if every small difference is considered a characteristic of a separate local form. — In Switzerland is found *simplonica.* **simplonica** (14 f), from the higher Alps, which is much darker in the ♂ and almost without any red, both sexes being without a black marginal band on the hindwing. — *strigulosa.* In **strigulosa** *Hamps.* (14 f) the black spots are more numerous in the forewing, especially at the margin, and the hindwing also has strongly developed spots on the disc, beside the marginal band composed of larger spots. — *dahurica.* **dahurica** *Bdr.* (= reticulata *Christ.*) (14 f), from Turkestan and South Siberia, the increase in the number of black spots on the forewing is more evident on account of the lighter tint of the ground-colour, the wings having a finely recticulate appearance, especially in the ♀. — *mannerheimi.* **mannerheimi** *Dup.* (= honesta *Frr.*) (14 g) has the reticulations thicker, as the black spots are smaller; the moth itself is often larger, and the ♂ has stouter antennae. In the Ural and in Anterior Asia. — *caecilia.* In **caecilia** *Led.* (14 g), a smaller form from Anterior Asia as far as the Altai, transitions to which are already found in Eastern Europe, the black spots are deeper black and so enlarged that they almost touch in the marginal area. Rebel named such East-European transitional specimens from Bosnia *slivnoënsis.* **slivnoënsis** (16 a). — On the other hand, in the West-European form *arragonensis.* **arragonensis** *Stgr.* (14 g), from Spain, the spots on both wings are reduced, so that there sometimes only remain dots of varying size. — *latina.* **latina** *Tur.* (14 g), from the neighbourhood of Rome, forms a transition to *mannerheimi*, the ground-colour being mostly lighter than in true *maculosa* and the spots being intermediate between both forms, but are sometimes reduced nearly as much as in *arragonensis*. — Lastly, it must be mentioned that the ground-colour, especially that of the forewing, varies in all the forms, and not least in true *maculosa*. Schultz has given a name to one of these aberrations, calling the light form *stertzi.* **stertzi.** — Larva velvety black, with short hairs and glossy black head, with a yellow clover-leaf shaped spot over the mouth, yellow or reddish dorsal line and short brownish oblique stripes laterally. The blackish grey warts have a bluish sheen, and those above the feet bear rusty yellow hairs (Ochsenheimer). Until May and again in July on Galium, pupating in crevices in the ground or under stones. Pupa blackish, with a blue bloom. Moth in June and August, in the South common in many localities, in the North no longer found in many of its former flight-places. The larvae are best sought in the noonday heat, as they then leave their hot hiding-places to crawl up the stalks of grass and weeds.

C. gruneri *Stgr.* (16 a). The original specimen of this form described from the Altai is in the *gruneri.* Museum at Dresden. Nothing further is known to us about this species; we therefore give a figure of the specimen, which is closely allied to the forms of *maculosa.*

42. Genus: **Trichosoma** *Oberth.*

This genus only consists of one species found in West Algeria, only the ♂ being known. The species is placed by Hampson in the large genus *Maenas*, together with American and Indian forms. It is undeniably allied to *Cletis*, and also to *Ocnogyna* (*O. pudens, leprieuri*) and may be considered a transition towards *Phragmatobia*, where Staudinger and Rebel place it; it is distinguished from *Phragmatobia* by the strongly pectinate antennae, in which it resembles *Cletis*.

T. breveti *Oberth.* (16 b). Forewing bright yellowish brown with transverse rows of black spots; *breveti.* hindwing pale carmine with black outer margin and discal spot. In Western Algeria: Sebdou, Tlemcen; found in October.

43. Genus: **Phragmatobia** *Steph.*

As now restricted this genus only consists of 9 forms, and is characterised by the small head, simple antennae and thinly scaled wings. Abdomen of ♀ very stout, brightly coloured, that of the ♂ very much shorter, with woolly hair. The tibiae, especially the foretibia, are thickened, hindtibia with 2 pairs of spurs. Tongue absent; the short porrect palpi entirely hidden in the woolly covering of the head.

P. fuliginosa. The ruby tiger has the thorax and forewing dark reddish brown with a blackish comma-shaped spot at the apex of the cell, edged with carmine. Hindwing carmine, more or less hyaline in the costal area, with more or less confluent black spots before the margin and at the apex of the cell. Throughout Europe and North Asia and parts of North Africa, from the Atlantic Ocean to Japan, and from Lapland to Morocco, and again in closely related forms in North America. The name-typical form **fuliginosa** *L.* (16 b) has the forewing rather densely scaled and the hindwing bright rose-red with distinct *fuliginosa.* black spots. Underside strongly suffused with purple-pink. Central and West Europe to Anterior Asia. — In North Europe occurs **borealis** *Stgr.* (16 b), which has vivid black markings and in which the red is *borealis.* confined to the sides of the abdomen and the anal part of the hindwing. Scotland, Scandinavia, Finland, Lapland. — ab. **subnigra** *Mill.*, with very dark forewing, must not be confused with the northern form; *subnigra.* it is scarcely darker than true *fuliginosa*, and not so strongly hyaline as *borealis*. In ab. **flavescens** *Schultz* *flavescens.* the abdomen and hindwing are yellow instead of red. — **amurensis** *Stgr.* i. l. is a form of the same size as *amurensis.* *fervida*, but is in colour almost exactly like *fuliginosa*, the forewing however being broader. — **pulverulenta** *pulverulenta.* *Alph.* (16 c) is a transition to *fervida*, the forewing being lighter than in *fuliginosa*, more yellowish brown, and the hindwing lighter and clearer, more flesh-colour, and with well-defined marginal spots; from Turkestan and Northern China. — **fervida** *Stgr.* (16 b) is the largest and lightest form. The forewing is strongly *fervida.* tinged with yellowish red, and therefore almost the same colour as the hindwing, the latter bears strongly reduced dots; South Europe, North Africa, local. — **placida** *Friv.* (16 c), from South-East Europe, Asia *placida.* Minor and Turkestan, is a very large form, usually regarded as a separate species, with the forewing more triangular and uniformly dark brown, and the hindwing pure light pink spotted with black. The forewing bears a carmine dot at the upper angle of the cell. — Egg reddish grey. Larva light or dark grey with black brown head. The entire body covered with foxy red hairs; these hairs are always more black brown in *placida*, and sometimes so in *fuliginosa*. In June, late autumn and after hibernation in April, on low-growing plants, on high-roads, railway embankments and waste fields. Pupa black with the abdomen marked with yellow in the segmental incisions. The moth at the end of April and in May, and again from the end of July, common everywhere on fences and in gardens, on roads and at brooks. On warm days in the winter the larvae sometimes leave their hiding-places and are then found on field-paths and roads, running about quickly.

P. coelestina *Püng.* (16 c). As large as *placida*, forewing mouse-grey, thinly scaled, hindwing almost *coelestina.* yellowish white with grey base, and dull grey spots before the margin. Both wings with blackish hook-shaped spot at the apex of the cell. Thorax and abdomen dark grey, the apex of the latter ochreous. Underside uniformly dull white without distinct discal spots; from the Altyn-Dagh in Central Asia.

parvula. **P. parvula** *Fldr.* (16 c). This moth from Kashmir is unknown to me in nature, and therefore we reproduce Felder's figure. The brown forewing has a rose-red costa and a dark oblique shadow; the hindwing is purple-pink with black marginal band and discal spot.

44. Genus: **Eucharia** *Hbn.*

Rather small moths with handsome markings: thorax broad, very woolly; wings rather short and broad. Head moderately large, with the frons narrow and so densely covered with woolly hairs that the eyes and palpi are quite hidden, and only the rather short antennae, which are strongly bipectinate in the ♂, protrude from the wool. Thorax, broad, especially in the ♂, with short and dense hair, which stands erect on the tegulae. Legs short, femora and tibiae densely covered with woolly hair. Abdomen of the ♂ short, shaggy, in the ♀ heavy, club-shaped, with shorter hair, brightly spotted. — The larvae similar to those of the preceding genus, densely clothed with short, shaggy hair, with a light dorsal line. There is only one brood. The moths come to the light. The larvae remain hidden in daytime and feed at night.

casta. *mediodivisa.* *deserta.* *nigrata.* *bivittata.* *lutea.* **E. casta** *Esp.* (16 c). Forewing dark brown, before and again beyond the centre a dull white transverse band, from which a strong tooth extends distad. Hindwing dull white in the ♂, rose-red in the ♀, with black-brown outer band. Central Europe, from the Pyrenees to South Russia, local and sporadical, usually common at its flight-places. In ab. **mediodivisa** *Spul.* (16 d) the tooth of the inner white band merges into the outer band, so that the band of the brown ground-colour lying between the bands is separated into two spots; mostly the dark base of the forewing is also divided by white lines or separated into small spots. In the form **deserta** *Bartel* the brown colour is extended, the outer white band of the forewing not being produced distad into a tooth, and the hindwing being predominantly smoky brown with a dull white median band. In ab. **nigrata** *Schultz* the forewing is almost entirely black. ab. **bivittata** *Spul.*, on the other hand, has on the hindwing an inner dark brown band running parallel with the outer margin. ab. **lutea** *Schultz* are ♀♀ with yellow hindwing. — Larva dark brown with velvety black dorsal spots divided by a yellow central line, and black warts bearing blackish hairs; in the summer on low-growing plants: it pupates in the autumn in a cocoon intermixed with earth; the pupa is stumpy and reddish brown, and the moth appears in the following June.

45. Genus: **Euprepia** *O.*

This genus contains 4 species, all Palearctic. It corresponds to the genus *Apantesis*, which is widely distributed in North America and contains a great many species similar to our *E. pudica*, certain authors also placing with it *A. quenselii*, which occurs inter alia in the Higher Alps of the Old World. The species of *Euprepia* are medium-sized, bicolorous, moderately brightly coloured moths, which resemble one another. They are distributed over the Mediterranean countries, only one species extending eastward to Central Asia. — Head and thorax shaggy. Frons narrow, with strong tuft of hair which partly hides the large eyes; palpi short, porrect; tongue aborted. Hindwing rather small in comparison with the forewing, with very few or no spots, while the forewing is usually brightly spotted. In some species there is a bladder-shaped organ laterally on the metathorax, which is considered an organ for the perception of sound. The larvae are unusually stout and plump, especially the middle segments being swollen; on grass, among the root of which they remain hidden in day-time. The moths usually rest on the ground, and are not rare.

rivularis. **E. rivularis** *Mén.* (16 c). The smallest species. White, forewing with numerous small black spots and comma-streaks, varying in number and distinctness, which has led to the publication of several names. Thorax above with shaggy ivory hair, in the middle and on each tegulae a black streak. In the Caucasus, Armenia, and Transcaucasia.

pudica. *flaveola.* **E. pudica** *Esp.* (= tessellata *Vill.*) (16 c). Larger, the ground-colour of the wings more or less tinged with rose-colour, the spots on the forewing larger and less numerous, the hindwing also sparsely spotted. Head black, the streaks of the thorax so broad that they almost supersede the whitish ground-colour, with the exception of the collar; abdomen red, spotted with black. As in *rivularis*, specimens occur which are blackened (ab. *gradli Schultz*) or have the markings confluent (ab. *cohaerens Schultz*). There is also a yellow form, ab. **flaveola** *Schultz*. — In South Europe and Mauretania. Larva dark grey brown with very short tufts of hair, which radiate from the warts; on grass; from the autumn until April, in daytime concealed among the roots. Before it pupates the larva rests for a few weeks in a cocoon under stones, sometimes together with ants, which do not appear to molest it. The moth in the late summer and autumn. In Spain, Southern France, Mauretania, Italy, Dalmatia and the Balkan Peninsula, common almost everywhere. On warm days the larvae also feed in the winter; one must not forget to put for them into the breeding-jar loose earth into which to crawl.

oertzeni. **E. oertzeni** *Led.* (16 c). Still larger than the preceding, forewing with only 8 or 9, mostly very large spots; hindwing, especially in the outer half, tinged with very bright rose-red. Head and thorax quite dark brown above. Syria.

E. diva *Stgr.* (= haberhaueri *Alph.*) (16 d). Hindwing usually without any spots, forewing with very *diva.*
few. Head, thorax and abdomen dull yellowish white, with very sparse dark markings. In Central Asia,
Turkestan and the Tian-Shan.

46. Genus: **Parasemia** *Hbn.*

Distinguished from the preceding genus by the longer pectinations of the antennae of the ♂. Rather small moths with slender ♂♂ and stout-bodied ♀♀: forewing fairly exactly triangular, dark brown or black with yellow or white stripes, hindwing red or yellow with black markings, only in aberrative specimens black or white. Head and thorax covered with dense and shaggy but soft hair; palpi short, porrect, with brush-like hair beneath. Eyes large, but partly concealed in the wool. Antennae of medium length, bipectinate in the ♂. Thorax with dark stripes in the middle and on the tegulae. Legs short, tibiae with long spurs.

The genus only contains one species, but this is distributed over a large portion of Europe, Asia and North America.

P. plantaginis *L.* (16 d, e). This moth is extraordinarily variable. Normally it has black forewing *plantaginis.*
in both sexes, with moderately broad, ivory yellow bands. The hindwing is yellow in the ♂, with an
irregular marginal band which is often interrupted, and 2 or 3 submarginal spots. The basal portion of
the hindwing bears black streaks at the margin of the cell, and before the anal margin. In the ♀ the
hindwing is red above with the base strongly black. It occurs in all temperate countries of the Northern
Hemisphere, but is often absent in the plains of the southern districts, being found in the plains only
in the North. From North Scandinavia to Andalusia and the Caucasus, from England to Japan and in
America in the West of the United States. Numerous aberrations have been found and named, which
often occur predominantly, often only exceptionally among typical specimens. In the Alps especially very
different forms occur in the same locality: ab. **hospita** *Schiff.* (16 e) is a form of the ♂, often occurring *hospita.*
also in the hills, in which the ground-colour of the hindwing is pure white instead of orange yellow.
The white ground-colour may also have much increased in quantity, the dark margins of the cell being
obsolescent: this is the case in ab. **bicolor** *Rätz.* In the alpine ab. **matronalis** *Frr.* (16 e), the hind- *bicolor.*
wing is entirely black with the exception of some light submarginal markings, the bands of the *matronalis.*
forewing also being narrower. In ab. **elegans** *Rätz.* (16 e) in which the light markings of both *elegans.*
wings are often reduced to slight traces, the ground-colour of the hindwing is white. — In
the ♀♀ the colour of the hindwing may be yellow (*flavipennis*) or pink (*roseipennis*) instead of red,
or may also gradually change from yellow in the basal half to red in the outer half. In
ab. **albulae** *Kilian* the ivory-yellow of the forewing is strongly tinged with reddish. ab. **subalpina** *Schaw.* *albulae.*
forms a transition to *matronalis*, the basal half of the hindwing being black, the outer half yellow (♂) *subalpina.*
or red (♀). ab. **borussia** *Schaw.* is the form of *subalpina* corresponding to *hospita*, the ground-colour of the *borussia.*
hindwing being white. In ab. **nycticans** *Mén.* (= melas *Christ.*) (16 e) the black is only slightly increased *nycticans.*
on the forewing, but so much so on the hindwing that its upper side presents a perfectly uniform black
surface. If both wings are uniformly black we have the rare ab. **raetzeri** *Schaw.* Of other aberrations *raetzeri.*
we mention: ab. **nigrociliata** *Schaw.*, which is the name for all specimens with black fringes. ab. **henricho-** *nigrociliata.*
viensis *Schultz* are yellow specimens in which the white streaks and band of the forewing are more or less *henrichoviensis.*
confluent. ab. **brunnescens** *Schaw.* (16 e) has in the ♂ the yellow colour of the hindwing suffused with brown — *brunnescens.*
and in ab. **rufa** *Tutt* the hindwing is red. — Of course, several aberrational characters may be found in *rufa.*
one specimen, so that double names result, such as **lutea-obsoleta** *Tutt*, in which the central markings *lutea-obsoleta.*
are absent, while the ground-colour of the hindwing is yellow. — In the Asiatic districts of its area the
moth differs from the European forms, but does not vary individually to the same extent as, e. g., in
many localities in the higher Alps. — In North Asia, especially Kamschatka, Amurland, Central Siberia,
the white colour of the forewing is nearly always increased, the ground-colour of the hindwing being
white (♂) or yellow (♀): this is the form **floccosa** *Graes.* — In Japanese specimens the markings of the *floccosa.*
forewing are sometimes snowy white instead of greenish white or ivory; Butler names such specimens
macromera (from which he moreover separates an ab. *leucomera*). However, this variety occurs aber- *macromera.*
ratively also outside Japan in other localities of the Palearctic region. On the other hand, ab. **melano-** *melanomera.*
mera *Butl.*, also described from Japan, are darker specimens which have the ground-colour of the hindwing
white in the outer half and stand between *hospita* and *borussia*. — The white may be so much increased
that the black is reduced to narrow marginal spots, the wing being otherwise quite white; this is the case
in ab. **confluens** *Schaw.* (16 f). — In Tibet occurs a constant, rather small form, **sifanica** *Gr.-Grsh.* (16 f), *confluens.* *sifanica.*
here the ground-colour of the hindwing is alike in both sexes, and in the cell of the forewing there is an
oval light spot. — Very similar is **altaica** *Stgr.* i. l. (16 f), from the Altai; little larger, but easily distin- *altaica.*
guished by the hindwing, which is scarcely more extended black in the ♀ than in the ♂. — The opposite
is the case in ♂♂ from the Orkneys, in which the edges of the cell and the submarginal spots of the
hindwing are so extended and the ground-colour of the latter so dark that the ♂ might be mistaken
for a ♀. I call this form **insularum** *form. nov.* (16 f). — In **caucasica** *Mén.* (16 f) the light inner marginal *insularum.* *caucasica.*

stripe of the forewing is interrupted in the centre by the dark ground-colour. The hindwing is slightly angulate, red, but also sometimes yellow (*caucasica flava*). — It must also be mentioned that a series of forms of *plantaginis* have been erected for North American specimens, and are sometimes treated as varieties of a separate species, sometimes as varieties of *plantaginis*, e. g. *modesta, petrosa, cichorii, selwynii, scudderi, geddesi, geometrica, coespitis*, which are dealt with in the American part (Vol. 6). — Larva black at both ends, with dark hair, the median rings reddish brown with foxy hairs, long bristles posteriorly; head black. From the autumn until May, on low-growing plants. Pupa dark brown with strong bristles posteriorly; in a loose cocoon. The moths are on the wing in June, in the higher Alps until August. The ♀♀ rest on leaves of low-growing herbs, and when flushed only fly a few paces before settling again. The ♂♂ are on the wing in daytime, being most lively in the afternoon, and have a rapid and precipitous flight, keeping about a yard from the ground; they are found especially in meadows in woods on alpine pastures and on broad roads overgrown with grass. When on the wing they sometimes make a distinct clicking noise. They are usually very common wherever they occur, and the different aberrations are found among ordinary specimens in a varying degree of abundance.

47. Genus: **Orodemnias** *Wallgr.*

This genus, like *Parasemia*, is distributed over the whole Northern Hemisphere, and intergrades imperceptibly with the American genus *Apantesis*, as whose boreal representative *Orodemnias* may be regarded. Three forms may be considered to belong to the Old World and three to the New, while *quenselii* belongs to both hemispheres. *Orodemnias* is much stouter than *Parasemia*. The small head is almost hidden under the collar; the antennae of the ♂♂ are almost simple like those of the ♀♀, the thorax of the ♀♀ is broad, the abdomen black in the centre with yellow or red markings laterally; the palpi short; tongue aborted; forewing dull ivory yellow and black. As far as is known, the species live in the temperate regions only at a considerable height in the mountains; but in the extreme North they inhabit the plains. They seem to require plenty of snow. The larvae have short hairs with longer ones only posteriorly, and sometimes hibernate several times before developing into the short-lived moths.

turbans. **O. turbans** *Christ.* (16 g). This moth superficially resembles *Parasemia plantaginis*, but the forewing is densely reticulated with cream-colour like *quenselii*. The ♀ is distinguished from the ♂ figured especially by the costal area of the hindwing being black in the basal half. From the higher mountains of Mongolia, Dauria and Kentei, where it represents the following species.

quenselii. **O. quenselii** *Paykull* (= strigosa *F.*) (16 g). Forewing almost exactly as in the preceding species, but the light veins narrower, often only as thick as a hair, on a black ground; hindwing blackish grey, in the ♀ spotted with orange-yellow in the outer area; fringes of both wings whitish yellow. In the highest Alps, especially in the Vallais (Riffel Alp) and Engadine, in the Tyrolean Alps (Antholzer Alp), in Graubünden, on the Bernina Pass and the Daniser Alp; in the Tauern and again the Tore district *liturata.* in Lapland. Also in closely allied forms in North America (*gelida*). — **liturata** *Mén.* is the East-Siberian form, with pure white stripes on the forewing and with the yellow of the hindwing increased so as to *falloui.* be predominant. — ab. **falloui** *Jourdheuil* is a rare ♀-form with the forewing yellowish white without markings and golden yellow hindwings, which are darker in the basal area. High Alps of the Vallais. Certain American *quenselii*-forms, e. g. *complicata* Walk., form a transition between this aberration and American species of *Apantesis*, as e. g. the much larger *virguncula*. — Larva black, with a median line composed of light dots, and black warts bearing dark hairs dorsally and reddish brown ones laterally. On stone-covered slopes and on pastures with short grass, until May on low-growing plants. They are said to attack other larvae together with which they are confined. The moth from June, flying also in daytime, in some years very rare, in others common.

cervini. **O. cervini** *Fall.* (16 g). Forewing dull ivory yellow, more or less tinged with reddish and spotted with black-brown. Hindwing of ♂ dirty yellowish, with greyish black spots at and before the margin; in the ♀ sooty grey, with light markings before the margin. In the Vallais, especially at Zermatt. — The *hnatecki.* form **hnatecki** *Frey* (16 g) is larger, the colour alike in both sexes, with strongly reduced dark markings of the forewing and almost entirely yellow hindwing; from a locality in the Alps of the Vallais which is not more definitely known. — Larva black, with black head and warts; a longitudinal stripe of grey-green hairs dorsally and a light dorsal line which fades as the larva grows older; resting among stones or on the bare ground; until June on Saxifraga and other low-growing plant. Pupa reddish brown with light segmental incisions, under stones in a loose cocoon. Many larvae are ichneumoned, the pupa being much infested with a species of Pimpla (Wackerzapp).

48. Genus: **Oroncus** *gen. nov.*

I place here several Arctiids which were hitherto either included in *Pericallia*, rather unnaturally, near *matronula*, or have only lately been described. Head rather small; frons narrow, roughly hairy; eyes strongly convex, moderately large; palpi porrect, of medium length, and moderately hairy. Antennae in both sexes slender, filiform, simple. Thorax above with rather long, but not very rough hair, black with dull yellow collar. Legs of medium length, all femora incrassate in the middle, the hindtibiae strongly hairy on the outer side, with a pair of long spurs beyond the centre and very short ones at the apex. Forewing with the inner angle completely effaced, black-brown, a broad ivory yellow costal stripe from base to two-thirds; hindwing bright red or yellow, with strong discocellular spot and elongate black spots before the apex and the anal portion of the outer margin. The venation (which is very constant in Arctiids) does not differ much from that of *Spilosoma*, *Phragmatobia*, etc. — The species of this genus, two in number, inhabit Central Asia and have only become generally known quite recently; nothing is as yet known of the early stages; they are said to inhabit Alpine regions, and hence the generic name: *ὄρογχος*.

O. urania *Püng.* (16 h). Abdomen black, yellow laterally and at the apex, forewing sooty black-brown with the costa broadly ivory yellow from the base to two-thirds, before the outer margin wavy markings of the same colour, sometimes dulled. Hindwing bright yellow with black spots at the apex of the cell and before the outer margin. North of Corea, at the Aksu Pass, in May and June. The original specimens in Herr Püngeler's collection. *urania.*

O. tancrei *Stgr.* (16 h). Abdomen black-brown, red laterally and at the apex. Forewing dark brown, with the costa ivory yellow to two-thirds; before the apex a dull white band runs to the inner angle; hindwing red, slightly tinged with yellow in the outer area. Underside very like that of *urania*. From the Issyk-kul, caught in May (Coll. Nassauer, Püngeler, Staudinger). *tancrei.*

49. Genus: **Micrarctia** *gen. nov.*

This group, which is closely allied to *Arctia*, only contains small forms, which are especially distinguished from the stout *Arctia*, whose abdomen is often club-shaped, by the slender build of the abdomen of the ♂ and also by the lesser bulk of that of the ♀. Hampson places them with the genus *Phragmatobia* on account of the similarity in venation: Leech even described one form as *Nyctemera*. The head is rather large, with broad tufted frons; eyes small; palpi slender, with tufts of hair, porrect; antennae of ♂ with long pectinations, or even plumose. Thorax stout, short, with moderately long hair, and bright markings. Legs slender, tibiae not visibly thickened, hindtibia with only the end-spurs, tibiae and tarsi whitish. Abdomen much slenderer than in *Arctia* and *Phragmatobia*, brightly coloured laterally and at the apex. Forewing triangular, dark reddish brown, with yellowish white streaks, hindwing moderately large, scarlet, only aberratively yellow, with black spots. The genus contains a large number of forms, which, however, probably belong to relatively few species, and is confined to temperate Asia.

M. trigona *Leech* (16 i). Forewing dark reddish brown; from the base and above the inner margin broad yellow rays, which merge together with a W-shaped spot of the same colour in the outer area. Hindwing red with black basal streaks and marginal spots. In ab. **nigra** *Leech* the light rays of the forewing are reduced and the hindwing is quite black. Ta-tsien-lu in West China. *trigona.* *nigra.*

M. y-albula *Oberth.* (16 i). Smaller, the markings of the forewing less confluent, small white spots at the costa; hindwing dull reddish yellow, blackish at the base. Here also occurs a form with the hindwing almost entirely black, the light bands of the forewing being reduced; this is ab. **lugubris** *Oberth.* In ab. **rubida** *Leech* the hindwing is scarlet instead of reddish yellow. From West China. *y-albula.* *lugubris.* *rubida.*

M. sieversi *Gr.-Grsh.* (16 i). On the forewing the yellowish markings are isolated, but slightly more numerous, and the longitudinal rays in the basal area are irregular. The black marginal spots of the red hindwing are large, rectangular. Tibet: the specimen before me (from coll. Püngeler) is labelled Kuku-Nor. *sieversi.*

M. rupicola *Gr.-Grsh.* (= glauca *Stgr.*) (16 k). According to the figure in Romanoff's Mémoires (IV, plate 19, fig. 6) this moth, which is unknown to me in Nature, is yellowish grey on the forewing, with two regular rows of black spots in the outer area and wedge-shaped rays at the base. The dull-yellow hindwing bears dark basal streaks, a discocellular lunule and two disc-shaped spots at the apex and above the anal angle. From the Transalai district. *rupicola.*

M. postflavida *Hamps.* This moth is also unknown to me in Nature. It was described in 1894 from a ♂ from Kashmir and is very small, not being larger than the preceding species. Head, thorax and abdomen grey-brown, the latter yellowish at the apex. Forewing very dark rusty brown with diffuse whitish markings; hindwing orange, with dark dusting, dark central lunule, and broad blackish marginal band. *postflavida.*

M. glaphyra *Ev.* (16 i). Forewing dark reddish brown, with deep black angulate spots, standing in creamy-white dentate markings; hindwing deep orange-red. From Ala-tau and Ferghana. — The form **manni** *Alph.*, from Tian-Shan and Issyk-kul, which has lately been imported in large numbers, has the hindwing scarlet. Specimens of this form in which the creamy-yellow markings of the forewing are tinged with rose-red are called ab. **rosearia** *Stgr.* i. l. (16 i), and those in which they are reduced is ab. **tristis** *Stgr.* *glaphyra.* *manni.* *rosearia.* *tristis.*

gratiosa. *glauca.* *puengeleri.* *amabilis.*

i. l. (16 k): ab. **gratiosa** *Stgr.* (16 i) are specimens in which the central lunule is absent, and ab. **glauca** *Stgr.* has the ground-colour of the forewing violet-grey, while the hindwing is pale brown; in ab. **puengeleri** *Böttcher* the hindwing is black. In ab. **amabilis** *Böttcher* a broad white median band runs transversely across the forewing. — All these forms occur in Central Asia, mostly in Ferghana, where the species is apparently very common.

kindermanni. *pomona.* *erschoffi.* *ferghana.* *transversata.* *issyka.* *mongolica.*

M. kindermanni *Stgr.* Forewing coffee-brown, streaked and banded with white, but the spots of the brown ground-colour not sharply angulate and with straight edges as in *glaphyra*, but cloud-shaped and with rounded corners and margins. In the typical form from the Ural the hindwing is orange-yellow; the same is the case in ab. **pomona** *Stgr.*, in which, however, a broad white ray traverses the middle of the forewing from the base almost to the outer margin and the base of the hindwing is not blackish as in true *kindermanni*. — **erschoffi** *Alph.* (16 k), probably specifically different from *kindermanni*, has the hindwing scarlet, and the wings of the ♀ are often aborted; from Tian-Shan. — **ferghana** *Stgr.* (= selmonsi *Böttcher*) (16 k) is a very small form from the Pamir, in which the brown spots on the forewing and the black ones on the hindwing are reduced. In ab. **transversata** *Böttcher* the light median band of the forewing is continued to the inner margin. — In **issyka** *Stgr.* (16 k) the black spots of the hindwing are larger, especially that before the apex being linear, and the cream-coloured bands of the forewing are tinged with yellowish; from the Issyk-kul. — **mongolica** *Alph.* (16 k) is the largest form; the very stout thorax has distinct bright markings, the tegulae being edged with dark, and the black dorsal stripe contrasting with the light sides of the thorax; the abdomen is dark scarlet with black median stripes; the bands of the forewing are narrow and strongly flexuose, the spots of the hindwing strong and numerous; from South-Western Mongolia. — We here draw attention to our remark on page 78 that *pretiosa Stgr.*, placed by Hampson with *Ocnogyna*, is a species closely allied to *kindermanni* and perhaps only a small aberration of *pomona*.

5. Subfamily: Spilosominae.

In the „Ermines“ the habitus of Arctiids is united with a monotonous white or grey colouring quite unusual in the other groups of this brightly coloured family. But this superficial and unimportant characteristic goes hand in hand with a number of other very conspicuous peculiarities. A broad head with the antennae sometimes quite short, a very woolly broad thorax which is almost without markings, a narrow and often long forewing, very slender ♂ abdomen and short strong legs are characteristic of most of the species belonging to this subfamily, which Hampson has mostly placed in one genus, *Diacrisia*, with about 150 forms, including the varieties. The venation is not only exactly the same in all these forms, but it is almost exactly a Bombycid venation and agrees with that of even quite heterogeneous species, e. g. certain *Lymantria*. We do not at all maintain that the *Spilosominae* form an anatomically different group from the other *Arctiidae*, but as in the case of the *Micrarctiinae*, only introduce this division here in order to attain the lucidity of arrangement, which is the main object of the present work. We characterise the *Spilosominae* as stout strong moths, usually with light colouring, frequently thin scaling and sparse markings, often reduced to dots. The insects are protected by oily secretions from glands of the thorax, and bear „warning colours“ only on the abdomen, the bright colouring of which at once distinguishes the moths from the often similar Liparids. The larvae on the whole are clothed with longer hairs than many of the preceding group and like nearly all larvae of Arctiids feed almost indiscriminately on low-growing plants, being usually common wherever they occur. The moths are pronounced nocturnals, and are distributed over all five continents. There seems to be a distant connection, especially expressed in the larvae, with the American genus *Palustra*, whose larvae live in the water, and with the more Central and North American *Ecpantheria*.

50. Genus: **Spilarctia** *Butl.*

This genus contains about 50 forms of „Ermines“ placed by Hampson together with many others in the genus *Diacrisia*. They all inhabit the Old World and about 20 of them occur in the Palearctic region. No species is known to me from Africa, and even Palearctic Mauretania has no representative of the genus, while *Spilosoma*, with much fewer species, is represented both in America and Africa.

Head moderately large; eyes hidden in the downy wool of the frons. Thorax with long shaggy hair; abdomen of the ♂ slender, that of the ♀ stout, heavy, and usually extending far beyond the anal angle. Palpi fairly short, porrect; tongue aborted; antennae of ♂ moderately pectinated. Legs usually brightly coloured or dotted, contrasting sharply with the light colour of the moth. Forewing usually with the costal margin strongly curved towards the apex, and with the outer margin convex; hindwing oval. The ground-colour of the wings and body is almost without exception creamy-white, more or less tinged with yellow, this colouring being only aberratively darker. The larvae are clothed with short but dense and stiff bristly hair, and have mostly a light dorsal line, and the ground-colour lighter laterally and ventrally. They seem to have only one brood in the North, living until the autumn on sorrel, dandelion, plantain, etc., run very rapidly, and pupate in a cocoon at the surface of the earth. The moths usually belong to the commonest species of their district.

lubricipeda.

S. lubricipeda *L.* (= lutea *Hufn.*) (15 a). Creamy white above, ♂ tinged with orange-yellow, ♀ with pale yellow. The forewing with a few black dots at the costal and inner margins, as well as with an oblique row which runs[1] to two thirds of the inner margin, being sometimes straight, sometimes slightly curved; abdomen orange-yellow with black dorsal spots. On the underside both wings bear strong median spots, and the forewing a straight oblique line which begins behind the cell and runs to the submedian vein. Throughout Europe with the exception of the extreme North, and in North Asia; from the coasts of the North Sea, Scandinavia and North Russia to the Mediterranean and from England to the Amur. — In different localities of Europe interesting melanistic forms occur, from which variously modified forms have been obtained by crossing with similar specimens and with normal ones[2]. The most important localities where these aberrations are found are the coasts of the Channel and the Low German coast with its islands. ab. **zatima** *Stoll* (15 a) has the internervular spaces at the forewing and hindwing brownish; *zatima* in ab. **deschangei** *Dep.* (15 a) the whole surface is grey-brown with the exception of the narrow white *deschangei.* veins and the thorax. The thorax, moreover may, also be blackened, this form being sold as ab. *unicolor Stgr.* i. l. (15 a), but must receive another name, as Homberg has already called the entirely white form by that name in 1907. I therefore propose the name **totinigra** *nom. nov.* for the uniformly *totinigra.* dark specimens. There occur all the transitions to these extreme forms (**eboraci** *Tugw.*), which have also *eboraci.* been obtained by cross-breeding. These as a rule bear on the unchanged light cream ground-colour black streaks at the margins of the forewing and on the hindwing (ab. *intermedia Stdfss.*). When the increase of the black marking is accompanied by transverse bands on the forewing the form ab. **fasciata** *Tugw.* *fasciata.* results. In contradistinction to this increase of the black markings a reduction of it may also be mentioned: ab. **unicolor** *Homb.* (= denigrata *Schultz*) in which all the black dots are absent with the exception of the *unicolor.* costal marginal spot nearest the base. — Egg round, silver-grey. Larva grey-brown, with yellowish red hairs, only slightly lighter dorsal stripe and yellow-brown head. In the autumn on low-growing plants. Pupa reddish brown, hibernating. Moth in May and June, nowhere rare.

S. rhodosoma *Tur.* (15 b). In this species, only lately discovered in Sicily, the black of the *rhodosoma.* upperside is increased by a larger number of the spots; but the species is especially distinguished by the bright red abdomen, which in *lubricipeda* is always orange-yellow like the forewing.

S. guttata *Ersch.* This form, which is only known to me from Fedtschenko's Reise, is creamy *guttata.* yellow in colour. Thorax spotted with black, abdomen orange, above with black rows of dots. Forewing with numerous small dark dots, which are partially arranged in rows and in which the one at the lower angle of the cell is V-shaped. Hindwing with dark median spot and two small spots near the anal angle. From Sarafshan in Central Asia.

S. melanostigma *Ersch.* Head, thorax and forewing light yellowish white; forewing with black dots *melanostigma.* and dashes arranged similarly to those of *lubricipeda*; at the base of the costa a black streak reaching almost to the middle of the costa; a spot in the middle of the cell and a dot at its apex; below the costa beyond the middle five black dots and a row of eight similar ones from the apex. Hindwing ivory white, with a black dot in the centre and two near the anal angle. From Turkestan.

S. obliqua *Walk.* This widely distributed species has the forewing creamy yellow, the hindwing *obliqua.* lighter and the abdomen scarlet or orange-yellow. In the ♂ small black spots on both wings varying in size and number; in nearly all ♂♂ there are present an interrupted submarginal row on both wings, an oblique shadowy line on the forewing, and a discal spot on the hindwing; in the ♀ the forewing sometimes only bears an oblique line from the apex towards the inner margin. Throughout South and East Asia, from Kashmir to North Japan and Corea, and in India southward to Travancore and Burma. The moth varies strongly; beside a number of forms produced by the variation of the black spots, which have not received distinctive names and do not deserve any, several geographical races have been separated, such as *howqua* from North India, *nydia* from Nepal, *todara* from the Nilghiris, etc. Only the Palearctic forms concern us here. — **dalbergiae** *Moore* (15 b), from Kashmir, has dull-coloured wings and *dalbergiae.* orange-yellow abdomen. — **ione** *Butl.* (15 b) has the abdomen scarlet with the exception of the yellow tip, *ione.* and the basal area of the hindwing light grey. Hokkaido, Japan. — **mollicula** *Butl.*, from Hakodate, also *mollicula.* has the abdomen red, but the basal area of the hindwing is strongly suffused with purple-red above; the oblique shadowy line of the forewing is absent in the ♀. — This line is present in the ♀ of **bisecta** *bisecta.* *Leech* (= mandarina *Moore*) (15 b), from Nagasaki and the opposite China; but this insect has the ground-colour of the forewing much duller, as in *dalbergiae*, from which it is, however, at once distinguished by the scarlet abdomen.

S. casigneta *Koll.* (= sanguinalis *Moore*, sagittifera *Moore*) (15 b). Strongly resembles *rhodosoma*, *casigneta.* but the black colour at the base of the costa is absent. The species is easily recognised by the underside, where the disc of the forewing is suffused with bright purple-red. Distributed from Kashmir over Tibet to Western China; also in the Indian Himalayas, where the species is very abundant. It varies strongly, and Hampson mentions specimens with the thorax black instead of orange-yellow. — **seriatopunctata** *Motsch.* *seriatopunctata.* (= striatopunctata *Oberth.*) (15 c). Also very closely allied to *rhodosoma*, and probably not specifically different from that insect. The black base of the costa is very distinct in the ♂ and the oblique row of dots on the forewing varies strongly in development. Hindwing above and below often strongly suffused with rose-red. This reddish hue may also be continued on the forewing, this being the case in *rosacea.* *basilimbata.* ab. **rosacea** *Butl.* In ab. **basilimbata** *Butl.* there are dark shadows in the internervular spaces of the forewing. The larva, according to Staudinger, very like that of *Spilos. menthastri*, somewhat darker and especially distinguished from it by the hairs of the separate tufts being denser. East Siberia, North China, Corea and Japan, locally very common.

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[1] Some recent authors consider Linné's *lubricipeda* to be the insect generally known as *menthastri Esp.* But as the two names are employed in the whole literature in the usual sense, an alteration can only lead to confusion.

[2] Cf. Standfuss, Handb. der paläarkt. Grossschmett. II. ed. page 307.

inaequalis. **S. inaequalis** *Butl.* (15 c). Very like the two preceding, smaller, the oblique row of dots of the forewing always complete, as in *casigneta*; distinguished from this form by the palpi being carmine below, instead of being black as in *casigneta*. The ground-colour varies from orange-yellow to creamy-white. In Japan, not rare.

costimacula. **S. costimacula** *Leech* (15 c). Forewing creamy-white, hindwing usually snow-white, thorax white with yellow markings; abdomen rose-red. Forewing with brownish spots at and below the costa, and with a very regular, somewhat curved, oblique row of brownish dots. In West China, Washan and Mupin.

rhodophila. **S. rhodophila** *Walk.* (= rubridorsa *Moore*) (15 c). Milky white, head yellowish, abdomen rose-red, with dots which are very faint in the ♀ and almost indistinguishable in the ♂. Laterally on the neck distinct small rose-red spots. From Kashmir to Western China; also in the Indian Himalayas, not being rare in Sikkim. Often only a discal dot and the oblique row of dots remain of the black markings; of the forewing. The species varies greatly as regards the size and intensity of these markings, a more weakly marked form (*dorsata*) has been separated from the form with stronger markings (*rhodophila*). — Larva dark brown, light brown laterally, with a reddish brown head. White streaks dorsally and rows of pale ones laterally, hairs long, on yellowish warts. On low-growing plants.

jankowskii. **S. jankowskii** *Oberth.* (15 c). Forewing and thorax ivory yellow, hindwing pure white, abdomen red, base of abdomen with white hairs. Very fine black spots at the apex of the cell of the forewing, traversing the latter in an oblique and sometimes interrupted row, which does not often extend beyond the submedian vein. In the ♀ usually only that part of this oblique row beyond the apex of the cell is *soror.* distinct, the lower part being only slightly indicated. From Amurland. — The form **soror** *Leech*, from West China, has no discocellular spot on the forewing, the oblique band of spots curves towards the costa, and there is a further spot at the inner margin. — Larva (last but one stage) black, the hair appearing grey because consisting of a mixture of black and white hairs; laterally on each segment three brown streaks, one above the other; head brown; venter with brown spots. Moth in August.

subcarnea. **S. subcarnea** *Walk.* (= bifrons *Walk.*, leucothorax *Fldr.*, erubescens *Moore*, trybakowi *Alph.*, oberthueri *Semp.*) (15 d). Thorax and forewing ivory yellow, the latter usually finely spotted with black. Hindwing purple-red or white, slightly suffused with rosy-red, seldom without a red tinge. Abdomen bright blood-red, white at base and apex, with black dots dorsally. Throughout Japan, Corea and China; eastward to the Philippines and southward to the Malay Archipelago.

robusta. **S. robusta** *Leech* (15 c) is probably only a more robust form of the preceding, the ♂ having black dots on the tegulae, while the spots on its wings are on the contrary somewhat reduced. Underside, as in *subcarnea*, often suffused with rosy-red. West China. Perhaps a seasonal form.

stigmata. **S. stigmata** *Moore* (= lacteata *Butl.*) (15 d). Light ivory yellow, hindwing creamy white; abdomen carmine. On the forewing, beginning at the apex, there is an abbreviated row of fine short black comma-shaped dashes, and a dark row of dots interrupted at the apex of the cell. The hindwing has a small black spot before the apex and two to four similar spots above the anal angle. In the ♀ the black markings are less distinct. Distributed from Kashmir over Tibet (Yatung) to West China. Pupa black with tufts of dirty white and black hairs; the hairs on the last segment reddish yellow.

comma. **S. comma** *Walk.* (= abdominalis *Moore*) (15 d). Thorax and wings pale orange-yellow, forewing with one or two costal spots and an abbreviated inner-marginal stripe, above the base and apex of which there are small black spots, which may be connected with the costa by rows of dark shadowy spots. Hindwing with dark discal dot, the basal portion often tinged with rosy red. Kashmir, appears to be rare.

bifasciata. **S. bifasciata** *Butl.* (15 e). The largest *Spilarctia*; ♀ sometimes as large as *Arctia caja*. Thorax and wings orange-yellow; two wide black stripes, merging together at the inner margin, traverse the forewing, the inner one of which is often interrupted, and the outer one sometimes also. Hindwing without spots, or sometimes in the ♀ with one to three black discal spots. Abdomen orange-yellow; dorsally a row of dots (♂) or transverse spots (♀). So far only known from the Main Island of Japan, where it was found at Tokio and Nikko. I caught two specimens near Yokohama.

flaveola. **S. flaveola** *Leech* (15 d). A small form, orange, suffused with red-lead colour, legs striped with black, abdomen pale red dotted with black above. Fore- and hindwing with a dark spot before the apex of the cell, the former with and oblique row of spots. West China.

flammeola. **S. flammeola** *Moore* (15 e). Likewise a small form; reddish orange; head light yellow, abdomen with fine dots, forewing with two parallel rows of dots, and also like the hindwing with a dark discal dot. East China (Ning-po, Kiu-kiang) and Japan, on the Main Island and near Nagasaki. Not common. In June and July.

lewisi. **S. lewisi** *Butl.* (15 e). Thorax and forewing dark grey-brown; the former with white smears, the latter with white veins and angulate, somewhat branching, longitudinal stripes. Hindwing yellowish, with brownish grey discal and marginal spots. Head white; abdomen scarlet, with black dots. In Japan, not rare on the Main Island; also in West China.

rubilinea. *discinigra.* **S. rubilinea** *Moore* (15 e). Forewing entirely earth-brown, faintly marked with small black dots; hindwing light yellow, tinged with red, with black discal and submarginal spots. Abdomen carmine, a stripe of black spots dorsally. In ab. **discinigra** *Moore* the basal area of the hindwing is suffused with blackish. West China. Also distributed in Northern India.

leopardina. **S. leopardina** *Koll.* (= divisa *Walk.*, liturata *Walk.*) (15 e). Creamy white, but thorax and wings so densely covered with large black spots that the ground-colour is entirely replaced with the exception of a few light veins and a few longitudinal and transverse stripes. Abdomen very bright purple red, with a row of black dots. The black spots vary somewhat in arrangement and distribution. Kashmir; also in the Indian Himalayas.

multiguttata. **S. multiguttata** *Walk.* (= spilosomoides *Walk.*, pardalina *Walk.*) (15 f). Forewing white, hindwing yellow, both densely covered with numerous rows of blackish spots, only the basal area of the hindwing in the ♂ usually free. Thorax white, also dotted, abdomen yellow, with transverse spots above.

imparilis. **S. imparilis** *Butl.* (15 f). ♂ black-brown, collar and abdomen orange. Through the forewing two angulate rows of black dots, one through the centre, the other before the margin. The hindwing also bears a submarginal, fairly straight, row of dots. The ♀ is quite different, creamy white with two angulate rows of dots, converging somewhat towards the inner margin, and a few further dots before the outer margin; hindwing entirely or almost without spots. Exceptionally the row of dots on the hindwing may also be absent in the ♂. Throughout Japan, not rare at Tokio. I obtained a specimen from the larva in August.

infernalis. **S. infernalis** *Butl.* (15 f). Butler has erected for this species the genus *Thanatarctia*, to which, if it were considered valid, the preceding species would also belong. ♂ uniformly black-brown, without markings, with carmine collar and abdomen. ♀ pale ochreous, forewing beyond the centre with a broad dark transverse band, interrupted by the light veins and narrowed at the submedian fold; a pale spot behind the apex of the cell. Hindwing with brown discal spot, a curved line beyond the centre and a row of small spots before the margin; in exceptional cases the hindwing may be entirely without spots. As yet only known from Japan.

51. Genus: **Spilosoma** *Steph.*

The species of this genus are without exception white in both sexes; in contradistinction to *Spilarctia*, which is confined to the Old World, *Spilosoma* is also distributed over America, in the North of which continent they are among the commonest moths. On the whole they are more stoutly built than *Spilarctia*, the forewing broader and not so pointed, the hindwing larger, abdomen short, scarcely reaching the anal angle. Larva short, clothed with dark hairs, and bearing a brightly coloured dorsal line. They have two broods, occurring in June and the autumn, and hibernate in the pupal stage. The moth in May, June and again at the end of July and in August, they are much attracted by light, and in daytime rest close to the ground on boards, tree-trunks and stones. They fly from soon after dark to 10 o'clok at night.

menthastri. *ochrea.* *brunnea.* *luxerii.* *walkeri.* *sangaica.* *punctarium.* **S. menthastri** *Esp.* (= erminea *Marsh.*, lepus *Retz.*, mendica *Rossi*, lubricipeda *Hamps.*) (15 f). Milky white, abdomen orange with black dorsal dots. Forewing more or less sprinkled with sharply defined black dots, of which there are always some at the costa and others arranged in rows in the disc. Hindwing with discal dots and often with anal ones and others. Antennae black. In specimens from Northern Scotland the forewing is sandy yellow: ab. **ochrea** (ab. 5 in Hampson), also found elsewhere as an exception among true *menthastri* (15 g). The forewing may be darkened to brown; this is the case in ab. **brunnea** *Oberth.* In ab. **luxerii** *Godt.* the forewing is suffused with rose-red distally and brownish proximally. In ab. **walkeri** *Curt.* the dots merge together to form radial streaks. Throughout Europe with the exception of the South, and in Central and North Asia to Amurland, China and Japan; here it usually occurs in the form **sangaica** *Walk.*, which is only distinguished from true *menthastri* by the sparse dots, especially in the outer area of the forewing. Specimens similar to *sangaica* occur aberratively also in Europe, bearing the name *paucipuncta Fuchs*, and in contradistinction to it there is the very strongly dotted *krieghoffi Pabst.* A still further reduction of the dots leads to ab. *unipuncta Strand*, in which there is only one dot on the hindwing. — **punctarium** *Cr.* (= roseiventer *Snell.*, doerriesi *Oberth.*) (15 g) is distinguished from *menthastri* by the carmine abdomen with sharp transverse spots, and by the wings being rather more spotted, being quite different from sangaica, with which its shares it native country. East Asia. It is probably because *menthastri* occurs in China as *sangaica* that many authors regard *punctarium* as a separate species. — Egg light yellow. Larva black-brown, with deep dark brown hair and orange-yellow dorsal stripe. On low-growing plants, from

July to September. Pupa black. The moths in May and June, sometimes again in the summer, common; often in great numbers on warm nights in June.

caeria. **S. caeria** *Püng.* (17 a). White, costal margin of forewing slightly brownish. Before and beyond the middle of the forewing interrupted chains of brown dots, similar dots being also found dispersed at the base, apex of cell and before the margin. Abdomen red with white tip; behind the head at the sides of the neck two red spots. From the Kuku-Nor.

urticae. **S. urticae** *Esp.* (= papyratia *Marsh.*) (15 g). Distinguished from the preceding species by purer white and somewhat more thinly scaled wings bearing only a few dots, mostly on the disc, and by the antennae being white almost to the tip. The black dots may be increased (= *pluripuncta Rbl.*), but may also be reduced to a few (= *quadripunctata Cosmov.*), or may be replaced by black streaks (= *radiata Spul.*). North and Central Europe as well as locally in South Europe. Also in the Ili-district, and said to occur at the Amur, if it has not been confused with sparsely spotted *menthastri sangaica* or with Strand's *unipuncta*. — Egg light yellow, almost conical. Larva blackish, with black head and dark brown hair. Stigmata white. Pupa black with yellow segmental incisions. The moth in May and again in August; much rarer than *menthastri.*

erythrozona. **S. erythrozona** *Koll.* (= cognata *Walk.*) (15 g). Snowy white, in the ♂ the basal portion of the costa black. Abdomen red, but with such broad black bands and lateral spots that little remains of the red ground-colour. Hindwing sometimes with a few small dark spots. Only known from Kashmir.

melanosoma. **S. melanosoma** *Hamps.* (15 g). Also snowy white, with very slight traces of dark spots; abdomen white, not red, with dark bands, otherwise very like the preceding. Kashmir and West China, probably also in the intervening Tibet; also in North India.

purum. **S. purum** *Leech* (15 g). Like the preceding quite white, with transverse, long or much abbreviated, bands on the abdomen, but twice or three times as large as *melanosoma.* From West China.

niveum. **S. niveum** *Mén.* (15 h). As large as or still larger than the preceding species; wings sometimes with traces of small blackish spots; abdomen laterally spotted with rose-red and dotted with black laterally and above. Throughout East Asia, East Siberia and Amurland, China with the exception of the south, Corea and Japan. — Larva densely covered with long yellow-grey hair, dirty grey with lighter lateral spots; it hibernates when young. The moths in July and August, local, but common at their flight-places: they fly out of the grass, making a noise according to Doenitz. I could also hear a slight clicking sound of the wings when *niveum* flew close by me, like that made by many larger Arctiids (especially *Callimorpha*, but also by the small *Par. plantaginis*).

album. **S. album** *Brem.* (= rubidum *Leech*, leucoptera *Alph.*) (15 h). Like the preceding, but the abdomen a brilliant blood-red. Wings sometimes with some black spots, usually at the base of the forewing and at the apex of the cell of the hindwing. West China to Corea.

52. Genus: **Alphaea** *Walk.*

This genus, which is variously defined, is most naturally conceived as consisting of about a dozen, partly Indian, tiger-moths with brightly spotted or striped forewings and fawn-coloured hindwings. To a great extent they are small forms which show an unmistakable affinity with *Spilosoma.* The palpi are short, densely and strongly hairy, porrect before the frons, which is sometimes rough-hairy. The tongue is usually absent or reduced. Frons broad, widely separating the small eyes. Thorax not so much humped as in the preceding genus, and head therefore not so much hidden. Forewing not so lanceolate, more triangular, hindwing comparatively small. Nothing is known of the larvae of true *Alphaea*; the moths seem to be much rarer than those of the two preceding genera, and are not so widely distributed. From a morphological point of view the genus must perhaps be sunk, as Hampson does; but as the facies is very different *Alphaea* may here be retained for the sake of convenience. The area of distribution extends from Kashmir to West China; the genus also enters Indian territory, as it occurs in Sikkim.

fulvohirta. **A. fulvohirta** *Walk.* (15 h). Thorax blackish, with white markings. Wings white, forewing with close blackish olive reticulations; hindwing with a few spots of the same colour in the disc and before the outer margin; abdomen dull orange-yellow with long greyish yellow hairs. West China and North India, probably also in the interjacent Tibet.

obliquifascia. **A. obliquifascia** *Hamps.* (17 a). This moth, which is unknown to me in Nature, resembles the common *A. tripartia* from India, but the white spots on the forewing are so arranged that they form a macular band, which starts from the base, is elbowed on the submedian and runs parallel with the outer margin to before the apex. From Kashmir; also distributed in the Indian Himalayas.

quadriramosa. **A. quadriramosa** *Koll.* (17 a) has light forewing with a network of dark veins, a scheme of marking recalling that of *Endrosa ramosa.* The thorax has three dark longitudinal stripes, the abdomen black transverse spots on an orange-coloured ground. Kashmir, where it is very widely distributed, in the Kulu, Kangra and Dalhousie districts, also distributed in the Goorais Valley and in the Indian Himalayas to Sikkim.

A. unifascia *Walk.* (15 h). Forewing white, with broad median band irregularly dentate at both edges, and with numerous small spots varying in shape and size, especially at the costa and inner margin. Hindwing with a few small spots on the disc and before the outer margin; the ground-colour is usually somewhat duller than on the forewing, even being suffused with dark brown in ab. **varia** *Walk.* Kashmir. *unifascia.* *varia.*

A. phasma *Leech* (15 i). This species, which LEECH placed in the genus *Thyrgorina* (also sunk by HAMPSON), and which really differs rather strongly from the preceding, has the thorax and wings creamy white; collar and abdomen orange-yellow, the latter with rows of dots dorsally and laterally. The forewing is densely irrorated with small pale yellowish grey spots arranged in transverse lines; darker spots at the apex of the cell and before and beyond the middle of the costa. In West China. Only the ♂ known. *phasma.*

53. Genus: Lacydes *Walk.*

In KIRBY's Catalogue this genus is composed of various species inhabiting partly Asia and partly Africa. The latter non-Palearctic species HAMPSON places in the genus *Maenas,* whose affinity to *Lacydes* is evident. Distinguished from *Spilosoma* by the more pointed forewing, smaller hindwing, slenderer build and much greater agility. It is said of *spectabilis* that it is attracted by baits; its tongue must therefore functionate and not be so much reduced as in all other allied genera, such as *Spilarctia, Spilosoma, Diaphora,* etc. Otherwise very little is known of their habits.

L. spectabilis *Tausch.* (= intercisa *Dup.*, incisa *Frr.*) (15 i). The long pointed abdomen of both sexes, the straight costal margin and long apex of the forewing, acutely pointed in the ♂, the small hindwing, etc., are characteristics enough to separate this and the following species from *Arctia* and *Diacrisia.* Thorax ivory yellow, with dark markings; abdomen orange with strong blackish bands, in the ♀ sometimes almost entirely blackish; hindwing creamy white with numerous small dark yellowish grey spots, which merge together to form stripes and almost uninterrupted chains. Hindwing with broad submarginal band of the same colour, in the ♀, moreover, with strong markings in the basal area. From Central Russia to Syria eastward through Anterior Asia to the Altai and Tian-Shan. The form **annellata** *Christ.* (15 i) has the spots on the wings light ochreous, partly narrowly edged with black, the submarginal band of the hindwing is often reduced to a few small spots, and the abdomen purer yellow; from Turkestan. — Larva above dark grey blue, with yellow hairs, the segmental incisions yellow; lateral stripe white, stigmata red. Until June on low-growing plants; the moth in July and August. *spectabilis.* *annellata.*

L. semiramis *Stgr.* This moth, which is unknown to me in Nature, is placed by HAMPSON in the genus *Maenas,* composed of Indian and South American forms and agreeing in many ways with WALKER's *Lacydes.* It is pale greyish yellow and has dark spots on the forewing, which are partly arranged in transverse chains. The hindwing is very sparsely spotted, with brown discocellular lunule. The moth comes from Syria. *semiramis.*

54. Genus: Aloa *Walk.*

This genus has the same pure white or ivory ground-colour as *Spilosoma,* as well as the brightly coloured abdomen, but the costal margin of the forewing is also vividly coloured and in conjunction with a collar of the same shade presents a characteristic study in colour, especially when the insect is at rest. The *Aloa* are usually large and strongly built moths with large head, very broad, flat, often brightly coloured frons, aborted tongue and relatively short and porrect palpi. Antennae short, in the ♀ scarcely more than one-third the length of the costa, in the true white forms (*Amsacta*) setiform without real teeth or pectinations. The thorax much raised, so that the head lies far down on the breast and when viewed from above entirely disappears under the prothorax, a characteristic which we also observe in the doubtless closely allied genera *Rhodogastria* and *Creatonotus.* Thorax beneath usually bright red at the sutures on a white ground; the foretibia likewise bright red, while the other legs are white. Forewing lanceolate, narrow and pointed, hindwing moderately large with rounded outer margin and pointed apex. MOORE places the genus with the very closely allied *Phissama,* KIRBY unites it with *Rhodogastria,* HAMPSON distributes the species over *Diacrisia, Amsacta* and other genera. We place here about a dozen, partly very closely allied, species, which touch our region in various localities in Asia.

A. lactinea *Cr.* (= frederici *Kirby,* marginata *Moore*) (15 i). In its especially large Palearctic specimens, one of which from Tsingtau we figure, this is the largest species of the genus, pure white with the abdomen striped with black and orange above and the costal margin of the forewing blood-red. Distributed from Kashmir over Northern India and the larger portion of China to Japan. — Larva black with strong warts, bearing long bristly hairs, laterally scarlet spots and tufts of reddish brown hair. MOORE names Menispermum glabrum as the foodplant for India (from GROTE's MS.). The larva is doubtless polyphagous and feeds on various low-growing plants; it hibernates and in May pupates in an ovate cocoon intermixed with hairs, the back of the abdomen being much swollen in the pupa, and the moth appearing in July (in the North). The moths are not rare and come to the light, resting in day- *lactinea.*

time near the ground. Outside the Palearctic region the moth is widely distributed in tropical India, being found as far as Java, and occurring in a slightly different form in Ceylon, where I caught the moth at various times of the year.

lineola. **A. lineola.** Less than half as large as *lactinea*. Forewing ivory yellow, costal margin and foretibiae much duller red, hindwing without spots. Uniformly dull white beneath, forewing with red, hindwing with dull yellow costal margin. Abdomen blood-red with a row of dots dorsally and sometimes also a few dots laterally. In true **lineola** *F.* (= strigata *Walk.*) (17 a) a black stripe only slightly interrupted by the median branches runs from below the cell towards the outer margin of the forewing. The forms *emittens Walk.*, *candidula Walk.*, *flora Swinh.*, *punctistriga Walk.*, and *rubricosta Moore* represent a series showing the gradual reduction of the black longitudinal line of the forewing, which in *rubricosta* is only indicated by a dot at the lower end of the cell. On the hindwing, which as a rule bears no spots, there may also be black dots on the disc and before the apex. Widely distributed in India and reaching the Palearctic Region in Kashmir. The moths are not rare, settling on stalks of grass on broad forest-roads, where they can be flushed by sweeping the grass; they only fly for a few yards, and in their flight somewhat recall *Leucania pallens*. I often caught several forms in one locality; in the Nilghiris and in Ceylon I found *emittens* to be the predominant form, to which belongs the specimen figured.

55. Genus: **Phissama** *Moore.*

Only two species should be placed in this genus, one of which is distributed throughout India and is common almost everywhere, occurring on Palearctic territory in Central China, the other inhabiting Syria and Arabia. Although in shape very like the preceding, they resemble in facies *Spilarctia*, being ivory with semitransparent wings and brightly coloured abdomen. Head large, with flat, broad, smoothly hairy frons; palpi and tongue small; antennae very short in the ♀, about half the length of the costa in the ♂, and with quite short ciliae, so that they appear simply setiform to the naked eye. Thorax very strongly convex, smoothly hairy; legs spotted with black at the knees. The larvae with shorter hairs than in the preceding genus, with the warts less large and the dorsal stripe more distinct; the pupa with the abdomen less swollen. The moths rest in the bushes or in the grass, and at night come to the lamp.

transiens. *vacillans.* **P. transiens** *Walk.* (= isabellina *Walk.*) (17 a). The name-typical form almost uniformly cream-coloured, with very transparent hindwing; at once recognised by four black dots at the apex of the cell of the forewing, which almost exactly form an oblong. ab. **vacillans** *Walk.* (17 a) has the ground-colour darker, dull grey-brown, and sometimes a few spots between the four on the forewing. Widely distributed, from Kashmir throughout India to China and Formosa, sometimes one form being predominant and sometimes the other. — Larva black with reddish spots and red-brown hairs; dorsal stripe broad, ivory, laterally with dark spots; on Dioscorea, Cissus, etc. The moths are common; they rest on low bushes on grass plots, from which they can easily be beaten, and only fly in day-time when flushed. I found the grey and the white forms together at the same place and in the same month.

gracilis. **P. gracilis** *Stgr.* Thorax and forewing creamy yellow; two black dots on the thorax, which is slightly suffused with rose-red anteriorly. Forewing with a few black dots in the basal area, a dot at the apex of the cell, a curved row beyond the centre and a small costal dot before the apex. Hindwing light grey with dark median dot. Abdomen red with black dots. Palestine; undoubtedly closely allied to *Creatonotus arabica Hamps.* from Aden, but the latter has spotted tegulae.

56. Genus: **Creatonotus** *Hbn.*

This genus also only contains one species, which is distributed over the greater part of India and extends from China in the north to Australia in the south. This single species is considerably more brightly coloured than the preceding forms. Tongue present, more than twice the length of the head; palpi obsolescent; antennae short; thorax flesh-colour with dark centre; abdomen bright scarlet. Shape of wings as in *Phissama*. Larva with much less dense but longer hair than in *Phissama*; pupa slenderer, and more pointed at the apex of the abdomen. The moth common, in daytime resting on herbs, often on the underside of leaves.

gangis. *continuatus.* **C. gangis.** Forewing pale flesh-colour; a dark olive-green longitudinal stripe runs from the base to near the outer margin and is broadly interrupted in wedge-shape by the ground-colour on the first median branch. Hindwing semidiaphanous. In the ♀ the ground-colour of both wings is lighter. Two forms are known: **gangis** *L.* (= interrupta *L.*, francisca *F.*) (17 a) and **continuatus** *Moore*, in which latter the median stripe of the forewing is completed by dark spots at the apex of the cell. From the Yangtse-kiang throughout India to North Australia. — Larva with long hairs and broad yellow dorsal stripe on which there are orange spots. Head with white markings. It pupates in a very loose cocoon and in hot countries the moth appears already after 7 days (Slater). Common.

57. Genus: **Areas** *Walk.*

If the species of doubtful relationship which Kirby places with *A. galactina* are excluded, only one species remains; a beautiful brightly coloured large moth resembling *Arctia villica* in the arrangement of the colours, but allied to the *Spilosominae* in the shape and markings, especially of the body, and in the similar venation. Frons broad, brightly coloured, shaggy. Palpi fairly long, upturned before the frons, with naked end-segment. Eyes small. Thorax moderately broad, not strongly elevate, so that the head protrudes distinctly in a dorsal view. Collar and tegulae white with dark spots. Abdomen long. Hindtibia with two pairs of spurs. Forewing lanceolate with the inner angle almost absent; hindwing rather small.

A. galactina *Hoev.* (= orientalis *Walk.*, trigonalis *Voll.*) (17 b). Large, forewing ivory with black-green veins and stripes, hindwing orange with red base and usually with a few black spots. Abdomen scarlet with black dorsal spots. In ab. **cana** *Druce* the hindwing is purple-pink. Kashmir, through North India to West China, usually rare.

galactina. *cana.*

58. Genus: **Arctinia** *Eichwald.*

This genus consists of one species, distributed from Central Europe to Japan. It has almost the facies of *Spilosoma*, with dense woolly hair, almost unicolourous with orange abdomen. The head is concealed in thick wool, the palpi are strongly hairy, the antennae rather short, pectinated in the ♂. The ♀ is usually smaller than the ♂, more densely scaled and more brightly coloured. The larva also resembles those of *Spilosoma*, and like the latter lives on low-growing plants; in two broods in the south of its area. The moth is found in nearly all districts of the area, but in many localities is a seldom-found rarity.

A. caesarea *Goeze* (= luctifera *Esp.*) (17 b). Sooty black brown, hindwing of ♂ more strongly diaphanous; anal angle of hindwing and abdomen orange-yellow, the latter with black transverse dots. From Germany and South Russia to the Mediterranean coasts and from France through Anterior Asia and Siberia to North China and Japan. According to Staudinger there is no essential difference between East Asiatic specimens (= *Atolmis japonica Walk.*) and Central European ones; but on the other hand there occur everywhere among typical specimens others in which the orange yellow colour at the anal angle of the hindwing is almost or entirely absent: such specimens being ab. **moerens** *Butl.* — Larva blackish, with very dark brown hair; dorsal line orange-red. In the early summer and again in the autumn on low-growing plants; pupa red-brown; the moth in May and again at the end of July and in August on walls, fences or at street-lamps; mostly rare, having been found in many localities only once or twice.

caesarea. *moerens.*

59. Genus: **Diaphora** *Steph.*

The name of this wholly Palearctic genus already indicates one of its characteristics, viz., the transparency of the wings, which in some forms is distinct only in one, in others in both sexes, and is only absent in *turensis*. Head and thorax densely clothed with woolly hair; eyes entirely hidden in the wool; palpi protruding from the wool of the frons as rather long black points. Antennae of ♂ usually with long pectinations, those of the ♀ simple and very short. Forewing triangular, a number of dots, which may be arranged in rows or dentate lines, being the only markings. Abdomen not brightly coloured. The larvae vary from black-brown to reddish brown in colour, with a narrow, sometimes indistinct, dorsal line and fairly dense hair; in the south of the area they occur everywhere in two broods, and the moths are usually not rare.

D. mendica *Cl.* (17 b). ♂ sooty brown-grey, usually with a black dot at the apex of the cell; sometimes without and in other cases with a few accessory dots. The ♀ thinly scaled, milky white, with the abdomen of the same colour; wings very sparsely dotted. ab. **rustica** *Hbn.* (17 c) are ♂♂ with the ground-colour milky white like that of the ♀♀. ab. **binaghii** *Tur.* are transitional specimens from the normal brown ♂♂ of *mendica* to *rustica*. — Schultz names ♀-specimens with only one black dot ab. **depuncta.** — By pairing the white ♂♂ of *rustica* with normal ♀♀ of *mendica* (which is an interbreeding of races and not hybridisation, as is usually reported) peculiar sand-coloured ♂♂ result, which are called **standfussi** (17 c). If the ♀ of *standfussi* is recrossed with the ♂ of *rustica* a white and much dotted moth results, the form **inversa** *Car.* (17 c). — But we have true hybridisation if the ♂ of *rustica* is crossed with another species of the genus, e. g. with the following species, *D. sordida Hbn.*; from this cross-breeding a real hybrid is obtained, viz., f. hybr. **viertli** *Car.* This may again be paired with other forms, e. g. with f. *inversa Car.*, by which cross **hilaris** *Car.* is obtained, or with *mendica*, whence **beata** *Car.* results, etc. — Egg light yellow. Larva grey-brown, greenish laterally, with reddish brown warts and foxy red hairs; on the back a median line, which is sometimes indistinct. It feeds on low-growing plants, in the north of the area in July and August, in the south in July and again in the autumn. Pupa stumpy, glossy reddish brown; the moth in June, or in May and in July and August, singly, but not rare in most

mendica. *rustica.* *binaghii.* *depuncta.* *standfussi.* *inversa.* *viertli.* *hilaris.* *beata.*

localities, throughout Europe with the exception of the Polar region, and in Anterior and Central Asia to the Altai.

sordida. **D. sordida** *Hbn.* (17 c). ♂ very like that of *mendica*, but with stronger dots, ♀ also dull greyish
brown. The forewing is much more densely spotted in both sexes, and the dots are already arranged in
carbonis. curved, often irregular, transverse lines. In ab. **carbonis** *Frr.* (= sordida ♀ *Hbn.*, semicana *Esp.*) (17 c)
the black dots are reduced and the insect therefore closely resembles the ♂ of *mendica*, but can always be
distinguished from it by the shape of the wings and by a row of dots at the apex of the cell forming
trifasciata. a transverse spot. On the other hand, in ab. **trifasciata** *Spul.* (17 d) the dots are so distinct and so
confluent that they unite to dense curved rows forming real narrow transverse bands. As has already
been mentioned under *mendica*, *sordida* has been crossed with the form *rustica* and *viertli Car.* has thus
been obtained; but the species has also been paired with the following, *D. luctuosa*, and true hybrids have
seileri. resulted, viz. the f. hybr. **seileri** *Car.* — Larva light blue-green with dark warts and light dorsal line.
Hairs dark brown; lateral line yellow; head black. It feeds on low-growing plants and pupates in the autumn; the pupa is black-brown and hibernates. Moth in June (I caught a worn specimen near Genoa already in the middle of June); in the plains sometimes a second brood in the late summer. It likes to settle on the underside of the leaves of nettles or brambles. The area of distribution is very limited; it only reaches from the Pyrenees to the Alps and the neighbouring countries of these mountains. In the Appenines I found the insect fairly abundant. The ♂ is on the wing in daytime and has a wild flight.

luctuosa. **D. luctuosa** *Hbn. G.* (= lugubris *H. Schäff.*) (17 d). This species represents the preceding in East Europe. Also smoke-grey, but slightly larger, wings broader, the ground-colour with a reddish tinge, which is especially visible at the distal margin. The rows of dots, which may also be partially united to form bands, are very distinct, especially at the costa of the forewing, but may also be reduced. However, the marginal dots are nearly always distinct, and the forewing on the whole is more densely scaled. The hybrid form, f. hybr. *seileri*, has already been mentioned under *sordida*. In the Eastern Alps, Austria, Hungary and the Balkan Peninsula to Greece. — Larva black-brown with dark foxy red hairs. In Austria in June and July, in Greece probably in two broods. The moth in the early spring and presumably in the summer. Locally not rare.

turensis. **D. turensis** *Ersch.* (17 d). Dirty grey-brown with long porrect black palpi. Forewing with strong
black dots at the base, a discocellular spot composed of several black dots and behind it a curved transverse line sometimes slightly interrupted. Hindwing little lighter, with a dark discal spot. In Central
maracandica. Asia, especially Turkestan, in the Tian-shan and the Kuldsha district. — The form **maracandica** *Stgr.* i. l.
(17 d), also from Turkestan, is considerably larger, often rather lighter, and the black transverse lines are reduced into often incomplete rows of dots.

6. Subfamily: **Arctiinae.**

The true Tigermoths are moderately small to large insects, often very brightly coloured and with the wings of an usually normal shape. The head is moderately large, the frons not very broad, with long dense hair, in which the eyes are concealed. The palpi are mostly covered with short and dense hair; the tongue is often absent or strongly reduced. The legs are strong, as as rule brightly coloured, with short spurs. Thorax stout, woolly, an oil-gland at each side of the neck. Abdomen of the ♀ usually very stout, often club-shaped towards the apex, sometimes so much so that flight is difficult. Forewing usually triangular, hindwing broadly ovate or rounded, both wings sometimes aborted in the ♀. — Larvae with very long, often shaggy hair; many of them, like the moths, are very brightly coloured. As a rule they are polyphagous, and feed on nearly all plants favoured by larvae, such as lettuce, dandelion, plantago, etc. Most of them have only one brood. About 200 species are known, which are widely distributed, most of them, however, inhabiting the Palearctic Region and North America, while they are considerably rarer in the Tropics. Great variability in the markings of the wings may be regarded as rather characteristic of the *Arctiinae*. Although it is conceivable that one is inclined to give names to more or less constantly recurring individual forms in which the markings are so enlarged or reduced or so confluent that the general facies is much altered, the introduction of names for specimens in which single spots are absent or confluent, as occurs in nearly all the *Arctiinae* in every imaginable combination, is merely a burden on science, which we must avoid here, if only on account of the restricted space at our disposal, the present work being already bulky enough. In larger lepidopterological works it depends on the personal views of the author how far he will go in accepting the named individual aberrations, and in a comprehensive work like the Macrolepidoptera of the World, the question of space is of decisive importance. However, it is quite out of the question among the *Arctiinae* to give a name to every single variation in marking, if only on account of the prodigious number of possible modifications, which, e. g. in *A. villica*, amount to as many as a thousand, all being certainly in existence, although some may accidentally not yet have been found. For that reason we have only more fully dealt with those names which have been accepted in catalogues and collections, while others based on mere anomalies in markings are only cursorily mentioned or entirely left out, being a mere encumbrance.

60. Genus: **Rhyparia** *Hbn.*

These tigers are medium-sized moths, strongly built, with large head, tufted frons, very broad thorax clothed with long shaggy hair, and with the abdomen also shaggy, and rather slender in the ♂;

antenna in the ♂ with rather long pectinations, in the ♀ setiform; palpi short, with moderately long shaggy hair, slightly down-curved; tongue aborted; legs strongly hairy; forewing triangular with straight margins and rounded angles, hindwing rather large, with the apex somewhat pointed and the outer margin very slightly excurved in the centre. The larvae are very hairy and have strong mandibles, so that they sometimes gnaw their way through the gauze of the breeding-cage. The genus is wholly Palearctic, its three species being distributed over the North of the Old World from the Canary Islands throughout Europe and North Asia to Japan. The genotype is *R. purpurata L.*

R. leopardina *Mén.* (14 g). Resembling *Cletis* in facies. Forewing of ♂ yellowish brown, of the ♀ dark brown, with black basal streak below the cell and only slightly darker shadowy spots, of which usually only a small one at the apex of the cell and a larger one below the apex before the outer margin are distinct. Hindwing spotted with black, in the ♂ pale pink, in the ♀ dark pink. In Amurland and Tibet, according to Oberthür also in Syria. *leopardina.*

R. rufescens *Brullé* (= fortunata *Stgr.*) (14 h). ♂ yellowish brown, ♀ darker brown, both wings suffused with rose-red. ♂ with four dark brown costal spots on the forewing, which are continued as very pale transverse bands to the inner margin, and with a small discocellular spot. In the ♀ the transverse shadowy bands are more distinct, but without a real sharp costal spot. Hindwing yellowish brown, suffused with rose-red, less in the ♂ than in the ♀. Only found in the Canaries. — Larva with long silky hair, brown, in ditches at the sides of roads, on cabbage and also on a species of tobacco (Nicotiana glauca). The species is, it seems, distributed over all the Canary Islands, and is not rare. *rufescens.*

R. purpurata *L.* (= purpurea *L.*) (14 h). Forewing bright yellow with transverse rows of pale grey or brownsih spots; hindwing brilliant deep purple-red with black spots. Throughout Europe with the exception of the West, and in North Asia to Japan, but local. — In the form **atromaculata** *Galv.*, which has long been known under this name in the trade, and which occurs at many places on the German North Sea coast, the dark spots of the forewing are very sharply defined, and those on the hindwing also larger and confluent. — There also occurs an inconstant melanistic form, such as is found in all Lepidoptera (ab. *obscura Schultz*), or in which the otherwise dark spots of the forewing appear light (ab. *infuscata Spul.*). — On the other hand, towards the East we observe a reduction of the spots of the forewing. According to a communication received from the missionary Herr Klapheck the specimens of *purpurata* are much less spotted in Shantung than for instance in Germany; in the countries of the Caucasus the spots are sometimes quite obsolescent, this being ab. **caucasica** *Alph.*; even in East Germany there is a slight reduction of the spots of the forewing in ab. **berolinensis** *Fuchs*, and this is stronger in ab. **immaculata** *Fuchs.* — ab. **flava** *Stgr.* are specimens with the hindwing dark yellow instead of purple-red, which Hübner already knew and which probably occur as exceptions everywhere. ab. **transiens** *Spul.* with the hindwing yellow distally is a transition to *flava*, and ab. *flavescens Spul.* with pale yellow hindwing is the extreme aberration. — Larva dark iron-grey, with velvety black transverse rings on which are placed small white stars and spots. The hairs are dorsally bright foxy-red and laterally whitish grey. A variety of the larva has lemon-yellow hair dorsally. From the autumn until the end of May on all kinds of plants, especially on Genista and allies, but also on all sorts of herbs and even on oak and willow bushes. It is advisable to collect the larvae when rather young in the spring, as they are later much infested by parasites. They have cannibal tastes, especially attacking specimens of their own kind in the pupal stage. The species occurs especially in sandy districts in the plains, in warm, sunny localities. The moths in June and July. The ♂♂ are on the wing on hot days between 11 a. m. and 1 p. m. and fly upwards slowly in a spiral until they disappear from sight; after a few minutes they slowly come down again into the bushes where they crawl away. The ♀♀ seem to fly at night. The moths are otherwise sluggish. The larvae are easy to rear on withering lettuce-leaves, etc. *purpurata.* *atromaculata.* *caucasica.* *berolinensis.* *immaculata.* *flava.*

61. Genus: **Rhyparioides** *Butl.*

More slender than the species of the preceding genus, which they resemble in the arrangement of the markings and in colour. Thorax of ♂♂ considerably narrower, abdomen thinner and longer. Palpi much longer than in *Rhyparia*, porrect, not obliquely down-turned. Antennae of ♂♂ with shorter pectinations. Larva of *R. metelcana* longitudinally striped with light yellow and grey, and with grey-brown hairs; habits as in the preceding genus. The area of distribution is also almost the same, but a few species occur in the tropics of India.

R. metelkana *Led.* (= flavida *Brem.*) (14 i). Forewing in the ♂ lemon-yellow, in the ♀ darker; a few dispersed black small spots; a reddish brown longitudinal smear on the median vein through the median area to the apex of the cell. In the ♀ the forewing is moreover traversed by angulate transverse rows of small dark red spots. Distributed in East Asia, in Amurland, Corea, and in Japan on Hokkaido, the Main Island and the Riu-Kiu Islands (Matsumura), also in restricted localities in Europe, in *metelkana.*

Hungary and said to occur also in Northern France. Spuler separates the East Asiatic form (*flavida*) from the European specimens. — Larva ivory-white, with blackish grey longitudinal bands, narrowly edged with white; there are tufts of dirty greyish yellow hairs on yellowish warts. Venter blackish grey, prolegs reddish brown (Horvath). On low plants growing in damp spots, such as Caltha and Euphorbia palustris, but may also be reared on dandelion. Until May at wet ditches and in boggy localities. The moth in July and August.

amurensis. **R. amurensis** *Brem.* (14 i). Wings much broader than in the preceding, but without the reddish brown streak on the median. Forewing bright yellow, in the ♂ with a few small black spots, especially at the costa and at the middle of the inner margin. ♀ with intricate reddish brown markings on the forewing; hindwing and abdomen in both sexes similar to those of the preceding species. Widely distributed in East Asia; in Amurland, North and West China to Sze-chuen, in the Yang-tse Valley, in Corea and the whole North of Japan; locally not rare.

nebulosa. **R. nebulosa** *Butl.* (= simplicior *Butl.*) (14 i). Larger than the preceding; forewing dull orange-yellow, with more or less numerous black spots, forewing of ♂ suffused with blackish grey from the median vein to the inner margin with the exception of the marginal area. Hindwing bright red with black spots. Especially distinguished from the preceding species by the dark suffusion of the forewing of the ♂, by the dark chequered fringes of the forewing and the altogether darker colour of this wing. In Amurland near Vladivostock, at the Ussuri and Suifun, in North and Central Japan, in July, local.

subvaria. **S. subvaria** *Walk.* (14 k). Forewing lemon-yellow, darker in the basal area, with a dot in the cell near the base and a group of small black and brown spots at the apex of the cell. Hindwing deep orange-red, a few black spots on the disc and before the outer margin. The ♀ has a few additional reddish yellow spots below the cell, and transversely through the forewing angulate rows of reddish dots. In China, in the North as well as in the South (Hongkong) and from the coast up the Yang-tse Valley to Central China.

62. Genus: **Diacrisia** *Hbn.*

This genus of Hübner's has been reintroduced when it was found that its genotye *sannio* was not closely related to the species *Parasemia plantaginis* generally placed with it in one genus *Nemeophila*. In his later classification of the Arctiids, however, Hampson considers *sannio* to be generically allied to the species of the preceding genera, and unites *Rhyparia*, *Spilosoma*, *Spilaretia*, etc., in one enormously large genus containing more than 150 forms. As it was necessary, however, for the sake of lucidity to split up this unwieldy genus into sections, we have not followed Hampson, but adopted for the various sections the generic. names proposed by former authors. The great sexual dimorphism in *sannio* appears to us to render it impossible to place *sannio* in the same genus as other less dimorphic species, such as *Spilosoma*. A further characteristic of *Diacrisia* s. str. is the more slender build of the ♂. It is separated from *Parasemia* and others by the areole being absent. — Head small; frons narrow, but clothed with dense woolly hair; palpi moderately long; tongue absent. Thorax small, round; abdomen in the ♂ very long and slender, in the ♀ stout, oval. Legs very much longer than in the preceding. Wings of the ♂ large, triangular, in the ♀ considerably shorter; apex rather pointed. Larva with tufts of hair, the hairs being longer posteriorly than anteriorly. The moths have two broods, which differ one from the other. They occur in the plains as well as in the higher mountains, almost as far as the limit of vegetation. They are confined to the Palearctic region, but are there distributed over nearly every country.

sannio. **D. sannio** *L.* (= vulpinaria *L.*, russula *L.*) (14 k). Forewing of the ♂ lemon-yellow, hindwing ivory yellow, both wings with a greyish red median spot and pink margin. In the ♀ the body and wings are suffused with brownish red. Throughout Europe with the exception of the Polar region, and in Iceland. — *pallida.* In **pallida** *Stgr.*, which occurs constantly in Central Asia and aberratively also in Europe, the black colour is reduced. — *irene.* In **irene** *Butl.* (= immarginata *Niepelt*), which occurs in Japan and locally also elsewhere in the Palearctic region, and is regarded by Matsumura as a separate species, the black colour is absent on the hindwing of the ♂ and the median spot on the forewing is generally reduced. — *uniformis.* In **uniformis** *Stgr.* (14 k), from Syr-Darja, the last trace of black and pink has disappeared, so that extreme specimens of this form are quite uniformly pale yellow on both sides of the wings and body. — In specimens from Ferghana, the Issyk-kul and the neighbouring countries further east in Central Asia, the red inner margin of the forewing is entirely absent, the black on the hindwing being however present. *mortua.* This is the form **mortua** *Stgr.* — Further eastward, at the Amur, a form occurs with very sharp black *amuri.* markings, and with the ground-colour of the hindwing strongly tinged with reddish, **amuri** *Stgr.* — In a mountain-form from above Zermatt in the Vallais [1]) I found the black colour increased in several of the specimens which I caught in August (the only brood?). In this form both sexes are alike in size, the ♀ being larger and the ♂ smaller than usual. It may be allied to **moerens** *Strand*, which is also darker and which Staudinger already described without naming it. In this form the hindwing is almost entirely suffused with sooty, so that the light ground-colour only appears as light spots before the outer margin. — Larva dark brown, with foxy red hairs, light dorsal line spotted with red, and white stigmata. From the autumn until the beginning of May and again in June and July, on various low-growing plants. Pupa reddish brown. The moth appears already after 2 or 3 weeks; it is on the wing in May and again from the end of July, exceptionally a third small brood in September. Common nearly everywhere on grass-grown wood-paths, in open woods and on alpine meadows. The ♂ rests in the grass, and when flushed flies precipitously for 30 or 40 yards, then settles again in the grass. The ♀ lies closer, has a whirring flight, and does not generally rise so high above the ground as the ♂. *moerens.*

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[1]) At Zermatt flies the form of the plains according to a communication i. litt. by Herr Püngeler.

63. Genus: Hyphoraia *Hbn.*

This genus consists of four or five species with nut-brown forewings spotted with yellow, and bright yellow hindwings sometimes suffused with red. Moderately small moths with very woolly head, even the eyes being hairy; palpi moderately long and porrect, but hidden in the woolly covering of the head; antennae of ♂ bipectinate, with long pectinations. Hair on thorax and abdomen long and shaggy; legs strong, spurs of hindtibiae moderately strong. Wings fairly short and broad. Larvae stiff-hairy, with small head. The genus is confined to the northern temperate and cold zones, but is circumpolar.

festiva. **H. festiva** *Bkh.* (nec *Hufn.*; = lapponica *Thunbg.*, avia *Hbn.*) (17 e). Wings thinly scaled; forewing reddish brown with yellow band-like spots on the costa and at the inner margin, and an irregular yellow band before the outer margin; hindwing black in the basal area, but in the outer area bright yellow with black spots. In the extreme North of Europe, Lapland; likewise in Siberia, and in a similar form (*hyperborea*) also in Arctic America. — Larva dark grey, with small black head and long black or foxy red hair. After hibernating twice it is full-grown in June; on moors, where it feeds on Vaccinium uliginosum and other bog-plants. The moth in July; it seems to be very rare, and is only occasionally offered by dealers. Formerly it seems to have been obtained more frequently.

ornata. **H. ornata** *Stgr.* (= kutschumi *Ersch.* i. l.) (17 e). Forewing dark grey-brown, five lemon-yellow spots at the costal margin, a row of similar ones before the outer margin and a few in the disc. Hindwing white in the ♂, orange-red in the ♀, with dark basal streaks, central lunule and submarginal spots. In the ♀ a large portion of the basal area is often black. In aberrational specimens the lemon-yellow spots of the forewing may be confluent, as is the case in the ♀ 17 e; this is an aberration frequently found in Arctiids, and in other species is called ab. *confluens.* From Mongolia (Urga).

alpina. **H. alpina** *Quens.* (= thulea *Dalm.*) (17 e). This moth like the preceding has the characteristics of a northern species well developed, viz. thin scaling of the wings, these being sometimes almost transparent, and a peculiar hairy clothing of the body. Forewing black, but much more densely spotted with cream-colour than in *festiva*, sometimes so much so that the white colour is more extended than the dark ground-colour. Lapland, Finland, Northern Siberia; very rare.

seitzi. **H. seitzi** *Bang-H.* has only lately been described, and seems to be closely allied to the preceding, at least in size and colouring. The light spots on the forewing are somewhat reduced and the colour faded to pale reddish yellow. In the hindwing the basal area is not quite black, but only has dark streaks. From the Issyk-kul district, doubtless very rare like *alpina.*

kolpakofskii. **H. kolpakofskii** *Alph.* This species, which is only known to me from the figure and is certainly not a *Callimorpha*, appears to be best placed here. The antenna is bipectinate. Thorax and forewing blackish brown, the latter thinly scaled with ivory white spots dispersed over the entire wing; hindwing and abdomen ochreous, the former yellowish red at the base, with smaller black spots at the margin and three larger ones at the anal angle, before the apex and at the centre of the inner margin. From the Tian-Shan.

aulica. **H. aulica** *L.* (= pustulata *Müll.*) (17 e, f). The reddish brown forewing bears yellow, round, drop-like spots, which are not placed on the costa (except one near the base). Hindwing bright yellow, spotted with black. In ab. **hamata** *Spul.* the yellow colour is so much reduced that beside slight traces on the forewing only a hatchet-shaped hook on the hindwing remains. ab. **radiata** *Spul.* has a yellow stripe above the inner margin of the forewing, which is more distinct in *dejeani*. In ab. **immaculata** *Gillm.* (= bicolor *Spul.*) the forewing is dark brown, the hindwing black, both with scarcely any yellow except for the yellow fringes. In ab. **extensa** *Schultz* only several of the yellow spots on the forewing are confluent. *hamata.* *radiata.* *immaculata.* *extensa.*

infernalis. defasciata. testudinaroides. ab. **infernalis** *Schultz* has the forewing spotted, but the hindwing blackened, and ab. **defasciata** *Schultz* on the other hand has lighter hindwing with the black reduced. ab. **testudinaroides** *Sov.* approaches the following species in the more brightly coloured hindwing. — In Europe with the exception of the north and west, in Northern Asia to the Amur, local and sporadical, usually not rare at its flight-places, found in great abundance at Ratisbon on the Keilstein. — The larva slightly resembles a half-grown larva of *A. hebe*, together with which it is often found, but it leaves its winter-berth a little later; it is black above with red hairs laterally, and pupates in April or May, the pupa being black, and the moth appearing already the end of May or in June (later in the North).

testudinaria. **H. testudinaria** *Fourcr.* (= maculania *Lang*, curialis *Esp.*, civica *Hbn.*) (17 f). Similar to the preceding, but the spots on the forewing larger, the hindwing of a beautiful scarlet tint, and also with the spots larger. In the Southern Alps, from South France to the Tyrol, and in Italy. The larva like that of *A. caja*, with long black and laterally red hair; until April on low-growing plants; the moth in May and June, much more local and rarer than the preceding form. Intermediate specimens have been bred by crossing *aulica* and *testudinaria*, which is comparatively easy, as *testudinaria* is probably only an extreme form of *aulica*. Aberrational specimens without the red colour on the hindwing also occur (ab. *crocea Schultz*).

dejeani. **H. dejeani** *Godt.* (17 f). In this species the yellow spots of the forewing merge together to form a long longitudinal streak, which is elbowed before the outer third, then widens in places and runs to the costa; hindwing yellow. In the mountains of the Iberian Peninsula. Hairs of the larva reddish brown anteriorly, long and black-brown posteriorly; the head black. Local and probably rather rare; few specimens in most collections.

64. Genus: **Pericallia** *Hbn.*

The very peculiar species *matronula* is probably best considered the only representative of this genus; it is a large, clumsily built moth. Head sunk far down on the breast, frons moderately broad, woolly; eyes rather large; palpi long, slightly down-turned; tongue aborted; antennae in both sexes with very thin and short teeth and therefore appearing almost setiform. Thorax very broad, brown with red streaks, the hairs at the base of the abdomen erect and forming curls. Legs strong, femora and tibiae slightly thickened, spurs of hindtibiae small and pointed. Abdomen smoothly hairy, brightly coloured, stouter posteriorly, especially in the ♀, in the ♂ with the claspers far exserted. Wings broad and large, hindwing with a deep groove below the frenulum, base of the median and submedian veins thickened below. Larva with long hair, light in its youth, then brown, and lastly almost black; it usually hibernates twice and pupates in the spring. The moth appears in the summer and often flies in daytime, or rests near the ground. The species prefers hilly districts, but does not occur in the higher mountains.

matronula. **P. matronula** *L.* (= idriensis *Scop.*, matrona *Hbn.*) (17 g). The large Tiger has cinnamon-brown forewing with lemon-yellow costal spots; abdomen bright orange with black spots, mostly forming bands. Very widely distributed from Eastern France throughout Europe to the Amur, but not in Japan. The arrangement of the spots on both wings is not constant, as may be seen from our figures of both sexes. Above all the lemon-yellow spots of the forewing may be reduced (ab. *pauciguttata Schultz*) or increased (ab. *multimaculata Schultz*) or divided (ab. *dissoluta Schultz*) or confluent; in the last case the yellow spots near the base (ab. *haliciaca Schille*) or those near the apex (ab. *concreta Schultz*) may be united; the latter spots may also be increased (ab. *centralasia Schultz*). On the hindwing the spots may be increased by an apical spot (ab. *nigroapicalis Schultz*); the spots of each row may be united to form complete bands (ab. *nigrostriata Schultz*), and these bands may anastomose (ab. *opaca Schultz*). The following forms have *serena.* a very striking pattern: ab. **serena** *Schultz*, in which the inner band of spots on the hindwing is almost *agassizi.* or entirely absent; ab. **agassizi** *Schultz* (= graeseri *Schultz*) in which there is a yellow complete band on the forewing from the costal margin to the inner angle, this band sometimes running along the inner *luteotincta.* margin for some distance; and ab. **luteotincta** *Schultz* with the forewing orange instead of lemon-yellow. — Egg whitish; larva when full-grown blackish with dark brown warts and long reddish brown hair. It hibernates twice as a rule and then pupates in the spring without taking any more food. They are difficult to rear, and bring many disappointments. It is advisable so to force the larva that it pupates after the first winter, in which, however, one is not always successful. The moth appears in May and June, and is found singly, more often in the East than in the West, and flies sometimes also in daytime, its flight being fairly rapid. Dandelion and willow are recommended as food-plants (v. Schick).

65. Genus: **Axiopoena** *Mén.*

This genus consists of one large species. Head large, frons woolly. Palpi fairly long, obliquely upturned, with small end-segment. Tongue long and strong; eyes large; antennae simple. Thorax woolly; abdomen stout, club-shaped posteriorly in the ♀. Hindtibiae with small spurs. Wings broad, of sombre colour. The large, stout moths inhabit rocky mountain-regions of Anterior Asia and sometimes fly in daytime.

maura. **A. maura** *Eichwald* (= kerelini *Mén.*, fluviatilis *Swinh.*) (17 g). Black-brown, the basal area of the hindwing and the back of the abdomen rose-red. In Armenia, Transcaspia (Krasnovodsk), Persia, Turkestan, Baluchistan, in rocky localities, where the moths congregate in crevices of rocks and are said to settle in large masses one on top of the other.

66. Genus: **Carcinopyga** *Feld.*

This genus only contains two species, with grey thorax, yellowish red abdomen and brightly banded forewing. The head is fairly large, with the frons woolly, the porrect and rather short palpi being hidden in the wool, with the exception of the end-segment; eyes small; antennae simple; body stout; legs moderately strong, hindtibia with small weak spurs; wings rather rounded. They inhabit Central Asia, from Turkestan to Kashmir, and appear not to be abundant.

lichenigera. **C. lichenigera** *Feld.* (17 g). Forewing slate-grey, with six slightly curved yellow transverse bands; hindwing flesh-pink, lighter in the costal area, with large black spots. Ladak.

proserpina. **C. proserpina** *Stgr.* (17 h). Forewing violet-grey, with six light bands, which are however only distinctly yellow at the costa. Hindwing pale yellow, spotted with black, more so in the ♀ than in the ♂. Turkestan. — Larva dark brown, ochreous at the venter, with sparse pale brown hair, and white spots laterally. Head black with two light spots; on species of Euphorbia and Artemisia.

67. Genus: **Gonerda** *Moore.*

This genus also only contains two species in the Palearctic region. It resembles the preceding genus in the yellow bands of the forewing, but the bands are differently arranged, encircling a dot-like streak in the median cell and forming a kind of maze. Head moderately large; thorax broad, with broad whitish collar and broad black tegulae. Abdomen purple-red, with black spots dorsally and at the apex. Wings broad, aborted in the ♀ of one species. Kashmir, and the neighbouring Tibet.

bretaudiaui. **G. bretaudiaui** *Oberth.* (17 h). On the forewing the light colour predominates, being a light lemon-yellow with a tinge of green, and the black markings traverse the wing as broad curved lines. Hindwing and abdomen purple-red, with three or four parallel black bands differing in width. In the ♀ the wings are only half developed. Tibet.

perornata. **G. perornata** *Moore* (17 h). Larger, more strongly developed, the ♀ with the wings fully developed, the black bands so broad as to reduce the yellow on the forewing and the red on the hindwing to narrow interspaces. Kashmir.

68. Genus: **Preparctia** *Hamps.*

This genus also consists of two species and is exclusively Palearctic; large, handsome moths with broad robust thorax and with the abdomen of the ♀ club-shaped posteriorly. Head fairly small, frons smoothly hairy; tongue strong; palpi long, porrect; eyes large; antennae simple, but with stout shaft; legs strong; hindtibia with moderate spurs. West China and Tibet.

romanovi. **P. romanovi** *Gr.-Grsh.* (17 h). Forewing black, with very peculiar creamy-white bands, which cross each other, traversing the wings in different directions. Hindwing golden yellow, before the outer margin three black spots, and on the disc a few smaller ones. Abdomen red. From Amdo in Tibet, from the Sinin Mts.

mirifica. **P. mirifica** *Oberth.* (17 i). Rather like the preceding in the markings, but in colour more like *A. caja.* Forewing dark brown, with white fasciae, hindwing bright scarlet with black spots. Thorax with white and black markings; abdomen red with dark dorsal and lateral dots. From West China, Ta-tsien-lu.

69. Genus: **Arctia** *Schrank.*

Strongly built, very brightly coloured moths, often flying in daytime in the sunshine, but swarming late at night. Head small, depressed. Frons smoothly hairy; eyes rather large; antennae of ♂ serrate; palpi short; tongue aborted. Thorax very broad and strong; abdomen of ♀ very stout posteriorly, that of the ♂ more densely hairy. Legs strong, hindtibia with short spurs. Wings large and broad, brightly coloured, forewing dark, spotted or banded with white, hindwing bright red or yellow, with black markings. In our conception of the genus it contains scarcely a dozen species, of which numerous varieties have been erected. As the spots are confluent in every imaginable way and also vary so much in their proportional size that it is difficult to find two exactly similar specimens, we confine ourselves to the enumeration of the more important forms so as to avoid undesirable expansiveness.

fasciata. **A. fasciata** *Esp.* (7 i) Thorax black, white laterally; forewing black, so much traversed by white bands that the light colour is predominant. Hindwing golden yellow, red at the margin, with black spots; abdomen bright scarlet with black tip and transverse dorsal spots. South France and Western *gratiosa.* North Italy. ab. **gratiosa** *Hbn.* (17 i), has the black of the forewing so increased that the white is reduced *oberthueri.* to narrow lines. — In North Africa there occurs the form **oberthueri** *Oberth.* (17 i) with the hindwing entire- *esperi.* ly shaded with red. — **esperi** *Stgr.* (17 i), from Spain, has the dark median bands united one with the other. *tigrina.* and ab. **tigrina** *Vill.*, which may occur throughout the whole area, but is commonest in Spain, is still more white than true *fasciata*, the bands being separated into costal and innermarginal spots. — Larva blackish grey, beneath reddish, with dark warts; above it is grey-brown with bright foxy red hair laterally; that of the form *esperi* is said to have a red dorsal stripe. Rearing is difficult and uncertain, but sometimes one obtains imagines from all the larvae without any apparent special reason, identical treatment often producing quite different results. Frequently the larvae get through the winter only to die in the spring. Normally they pupate in May, the moth appearing in June or July, not being rare in South Europe; the Mauretanian form *oberthueri* appears to be considerably rarer.

dido. **A. dido** *Wagn.* (18 d). Forewing wood-brown, with lemon-yellow spots at the base and margin; hindwing bright red with blackish spots edged with whitish. In North Africa; as yet only found at a few places, especially in Eastern Algeria near the frontier of Tunis, in June; comes to the lamp at night.

thibetica. **A. thibetica** *Feld.* (= suttadra *Moore*, cajula *Stgr.*) (18 a). Forewing reddish brown, with sparse light spots; an irregular yellowish band begins before the outer third of the costa and runs straight to the inner angle. Hindwing bright scarlet with a few discal spots and a black band of spots before the margin. *pulchrior.* In ab. **pulchrior** *ab. nov.* the light spots of the forewing are considerably larger, the discal spots of the *aurantiaca.* hindwing are absent and the submarginal band of spots is interrupted. ab. **aurantiaca** *nom. nov.* is a form with yellow hindwings. — From Kashmir to Tibet, widely distributed, in mountainous regions, often not rare; in Kulu and Dharmsala in the south, also at Ladak and Chitral.

intercalaris. **A. intercalaris** *Ev.* (= alpherakii *Stgr.*) (18 a). Forewing black-brown, banded with ivory, with almost the same colouring and marking as a small *caja*. Hindwing brilliant scarlet; before the margin black *ilithya.* spots, which may be confluent. — In the form **ilithya** *Böttcher*, from Naryn, the light median band is absent, the white on the forewing being reduced and distributed as in *A. thibetica*. — In Turkestan, Tibet, and in Siberia in the Altai.

caja. **A. caja** *L.* (18 b). Forewing dark brown, banded with white as in the preceding, but quite twice as large. Hindwing bright red, before the margin and in the disc with black spots having a steely blue centre. Thorax brown with red collar. Abdomen scarlet with black transverse dorsal spots; no lateral spots. There are very many aberrations, which were partly obtained artificially, partly by chance. Oberthür mentions about 500 different *caja* and figures 36 such aberrations. This great variability chiefly consists in the increase in size or the reduction of the white bands of the forewing and the black *phantasma.* spots of the hindwing. ab. **phantasma** *Niepelt*, in which the forewing is uniformly creamy white and the *obscura.* hindwing vermilion without any spots, and ab. **obscura** *Cockll.* (= futura *Fick.*, glaseri *Stichel*), in which the forewing is dark brown without any marking, and the hindwing uniformly black, are the extremes of a series of named forms, as e. g. ab. *luneburgensis Machl.-Stein*, *syltica Wern.*, *dealbata Schultz* (in the *rubrodorsalis.* direction of *phantasma*) and *clarki Tutt* (towards *obscura*). Of aberrations in other directions we mention: *pallens.* ab. **rubrodorsalis** *Schultz*, in which the black spots on the abdomen are absent, ab. **pallens** *Schultz*, in which *lutescens.* the ground-colour of the forewing is brownish yellow, and ab. **lutescens** *Tutt* (= flava *Aign.*) in which the *standfussi.* hindwing is sulphur-yellow. Röber names small specimens obtained by inbreeding ab. **standfussi.** — Throughout Europe and Anterior Asia, from Scandinavia, Lapland and North Russia southward to the Mediterranean and from the Atlantic Ocean to the Pamir, Kashmir and even Assam. — The species also varies geographically; and we have firstly forms which are found aberratively together with ordinary *confluens.* *caja*, e. g. **confluens** *Rbl.* (18 a) is a variety occurring constantly in the North (Lake Ladoga) with the white of the forewing reduced and the ground-colour of the hindwing dark deep red, the black spots *lusitanica.* being more or less confluent. — **lusitanica** *Spul.* (18 b), on the other hand, has the hindwing and abdomen light red-lead colour with the spots of the hindwing separated. — In Asia *caja* is considerably larger than in Europe; already in Asia Minor it is larger, with much white on the forewing and the hindwing *wiskotti. phaeosoma.* in the ♂ almost white; this is **wiskotti** *Stgr.* — **phaeosoma** *Butl.* (18 b), from Eastern Asia, is at once distinguished by the white tegulae. In this form, which is the normal one in Japan, East Siberia, Corea and North China, the white may be predominant on the forewing, but may also be aberratively reduced, as in European specimens. In East Asia, where the larva of *phaeosoma* is locally extraordinarily abundant *auripennis.* (Graeser), specimens often occur with yellow abdomen and hindwing; this is ab. **auripennis** *Butl.* — *orientalis.* In **orientalis** *Moore*, from Kashmir to the Khasia Hills, the thorax and forewing are more yellowish red-brown, as in certain local forms in North America, where *caja* occurs in some very different varieties (*utahensis, opulenta, transmontana,* etc.). — Egg greenish white, larva with very long and dense hair, which is red on the anterior segments and on the others black above and only red laterally, placed on warts with a whitish gloss; when touched roughly the hairs sting slightly, but do not cause any noteworthy inflammation. From September until May, at the edges of woods, on meadows in the woods, on nettles, dandelion and many other low-growing plants. Attempts to breed aberrations by feeding the larvae with certain plants (foliage of walnut, etc.) were not successful. Common.

A. flavia *Fuessl.* (= virgo *Hbn.*) (18 h). As large as *caja*, but the forewing black streaked and banded with white, the black median area, however, not being divided. Hindwing yellow with black spots. Abdomen red, black dorsally and at the apex. In the Higher Alps, but only sporadical, occurring in the Upper Engadine, in the Grisons, the Vallais, etc. The specimens vary extraordinarily, even in the same locality. ab. **rosea** *Lorez* has the hindwings tinged with rose-red, in ab. **obscura** *Lorez* they are brown like the underside. In ab. **flavoabdominalis** *Lorez* the abdomen is yellow instead of red. In ab. **atroabdominalis** *Schultz* the black of the apex is extended over the entire abdomen. ab. **stygialis** *Schultz* has the forewing entirely black. Instead of black the forewing may be more or less deep brown (ab. **brunnea** *Spul.*). In ab. **nigricans** *Lorez* there are still traces of white. The costal border may be much broadened; this is the case in ab. **latemarginata** *Schultz*; it is mostly white, but may be yellow, as in **flavocostata** *Spul.* In ab. **angustesignata** *Spul.* the white is altogether extended and the black reduced. Although names have been given to specimens differing in the markings they are of little value. — On the other hand *flavia* varies slightly geographically. In the Ural the form **uralensis** *Heyne* occurs, with the forewing very thinly marked with white, the costa being black and the hindwing darker yellow. — In the Altai **sibirica** *Heyne* is found, with very light yellow hindwing and the colour often altogether paler. — In **campestris** *Graes.*, from the Amur, the median spot does not reach the inner margin. — Egg white. Full-grown larva black, with greyish yellow hairs; warts dark, hairs with white tip. Hidden in daytime in crevices of walls and boulders; feeds at night on low-growing plants, hibernates twice and pupates in June in a cocoon between stones, the pupa being brown and immobile. The moth in July. It flies late at night, coming to the light. At midsummer one may sometimes find at the same time in crevices of the same heap of stones freshly laid eggs, half-grown larvae, pupae and fully developed moths. The species, which is much sought after by collectors, is already much decimated at many of its former flight-places.

flavia.
rosea.
obscura.
flavoabdominalis.
atroabdominalis.
stygialis.
brunnea.
nigricans.
latemarginata.
flavocostata.
angustesignata.
uralensis.
sibirica.
campestris.

A. villica *L.* (18 c). The Cream-spot Tiger has black forewing with usually rounded ivory white spots, and bright yellow hindwing spotted with black; abdomen red with black dorsal spots to the tip; triangular white spots on the tegulae. In Northern and Central Europe with the exception of the Arctic region; in varieties southward to the Mediterranean and eastward to Anterior Asia. — The species varies very much individually. The white spots of the forewing may merge together to form transverse bands (ab. *fasciata*) or longitudinal ones (ab. *radiata, ursula*); they may be reduced in size (ab. *paucimaculata*) or in number (ab. *medionigra, strandi*). On the other hand, the black ground-colour can be almost superseded by the white spots, so that only traces of it remain, as in ab. **neglecta** *Schultz.* Again, specimens are known which are almost entirely black: ab. **caliginosa** *Schultz.* If both the white forewing and the hindwing are almost unspotted we have ab. **illustris** *Schultz.* Oberthür (Études XX, plate 16, 17) figures a great many aberrations without proposing any names, in which we gladly follow him; so do Möbius and Winterstein in Iris 17 plate 6, and 18 plate 2. Especially in England, where such sports are very much sought after, the collections are rich in such abnormal specimens. To these belong also the more common form ab. **contracta** *Schultz*, whose hindwing bears black bands, and ab. **crodeli** *Schultz*, in which the costal margin of the hindwing is blackened. Sometimes the ground-colour varies; that of the forewing may be grey: ab. **pallida** *Schultz*, while that of the hindwing is brown in ab. **brunnescens** *Schultz.* — Local variations of *villica* both in colour and markings are more interesting. In **konewkai** *Frr.* (= domiduca *Mg.*) (18 c), from Italy, South Spain and Persia, as well as the lower altitudes in Sicily, the white spots of the forewing and usually also the inner discal spots of the hindwing are united to form bands. — In **bellieri** *Failla* (= chavignieri *Failla*, brunhilda *Stgr.* i. l.) (18 c), from the higher altitudes of Sicily, both the ground-colour of the forewing and the spots on the hindwing are chestnut instead of black. — **angelica** *Bdv.* (18 c) has the spots of the forewing lemon-yellow instead of white; from South Europe, North Africa and Asia Minor, local. — **confluens** *Rom.* is a form with the spots of the forewing confluent, which is however constant in localities where true *villica* does not occur, as in North Persia, Armenia and parts of Turkestan. It is characteristic of the form that the two large external spots are broadly confluent, while the inner ones are more or less isolated. — **fulminans** *Stgr.*, from Syria, has the hindwing bright red instead of yellow. — Egg white. Larva iron-black, with reddish brown head and legs, black warts bearing tufts of brown and grey hair. Stigmata white. Until the beginning of May on low-growing plants. Pupa in a coarse cocoon, black with brown segmental incisions and a tuft of bristles at the apex. Moth in June and the beginning of July, almost everywhere in East Europe, in the west more sporadical and absent in large districts or becoming rarer from year to year;

villica.
neglecta.
caliginosa.
illustris.
contracta.
crodeli.
pallida.
brunnescens.
konewkai.
bellieri.
angelica.
confluens.
fulminans.

e. g. at Frankfurt a. M. and Mainz, where it has been practically extinct for many years. In South Europe still very common at most flight-places. In daytime it rests on leaves, but is easily flushed, when it goes off in a rather high parabolic curve, settling again at a short distance, therefore being easily caught.

rueckbeili. **A. rueckbeili** *Püng.* As large as *villica*; forewing rather narrow with oblique slightly incurved outer margin, pale grey-brown with dull white spots, the largest of which is situated at the base and contains two or three dark dots. Other spots partly at the costal and partly at the inner margin. Hindwing dull yellow with two brown-grey median bands, and a broad grey marginal band of the same colour only reaching the margin at its upper end and connected with it at the middle by a few rays. Abdomen above yellowish with grey spots. Found in May in the desert south of Aksu (Central Asia).

hebe. **A. hebe** *L.* (= festiva *Hufn.*, nec *Bkh.*, monacha *Fourcr.*). Forewing dull white, with more or less numerous black transverse bands edged with rust-colour and sometimes interrupted and running from the costa to the inner margin. Hindwing purple-red, with black transverse spots. In Europe with the exception of the extreme West, North-West and North, in Anterior and Central Asia, where several local forms occur. From Livonia to Calabria and Syria and from Paris to Manchuria, but always local. The commonest *lugens.* aberrative specimens are those with the black bands of the forewing broadened (ab. **lugens** *Schultz*), some- *albicans.* times suppressing the ground-colour altogether. On the other hand, ab. **albicans** *Fuchs* is a form in which the white predominates, the black bands of the forewing being only slightly indicated. — Schultz calls *bivittata.* *wassi.* specimens with the inner band of the forewing doubled ab. **bivittata.** In ab. **wassi** *Aign.* the hindwing and abdomen are yellowish brown instead of purple-red. — More important are certain local forms like *sartha.* **sartha** *Stgr.* (18 d), from Turkestan, smaller, with narrower wings, the collar with bright light edge; a strong darkening of the forewing, which is not rare in specimens from Turkestan and Europe, is not constant. — *interrogationis.* **interrogationis** *Mén.* (18 d) is the eastern form from Siberia and Manchuria, in which there is a great deal of white on account of the much narrower bands of the forewing. Grum-Greshmailo calls specimens of this form with very distinct red collars (this being sometimes the result of the setting) ab. *collaris.* **collaris.** — Egg yellow, later on grey. Full-grown larva black, with black head and warts, the latter bearing grey hairs dorsally and rusty yellow ones laterally. Until April on sunny fallow fields, on low-growing plants, especially spurge. Pupa in a loose cocoon on the ground, which can be recognised by the silk-threads glittering in the morning dew; black with small bristles posteriorly. The moths at the end of April and in May; they only occur in sandy districts and only in the plains. In day-time they rest on or near the ground; the ♀♀ have a very heavy abdomen, and when ovipositing run with whirring wings along the ground, from which they can scarcely rise. The species is usually common where it occurs, but local, and mostly the larvae can only be found on certain definite fields, where great quantities of them may be encountered in the early spring. Some of the larvae are, however, always attacked by a certain fungus, Empusa aulicae, and occasionally the disease is introduced into the breeding-cages with such larvae. The best result is therefore obtained if one breeds the larvae separately or only a few together in small flower-pots. It must be observed that the larvae sometimes attack fresh pupae of their own kind, and gnaw through thin gauze. Exposure to low temperatures now and again produces melanistic examples, but generally kills the specimens or results in cripples. Sunshine is necessary to the larva, which then feeds greedily and grows rapidly.

7. Subfamily: **Callimorphinae.**

In contradistinction to the preceding group of clumsy nocturnal moths with the tongue mostly aborted, we have the very slender light-winged flower-loving *Callimorphinae* which are nearly all diurnals enjoying the sunshine, and almost exceed in brilliancy of colour the bright *Arctiinae*. The blackish wings usually have a bright green metallic gloss and rounded white or yellow spots or stripes; the hindwings are bright deep red or purple red, yellow or white. The larvae are mostly more brightly coloured than those of the preceding group, and with the hair not so long and shaggy as in those. The *Callimorphinae* do not occur in Australia, but are fairly universally distributed in the Northern Hemisphere. However, they do not extend so far northward as certain genera of *Arctiinae*, and it is worthy of note that always only a few species occur in one locality, the greatest number being found in the North-Western Himalayas, where the Palearctic and Indian genera meet. Nearly all the species are common where they occur, many of them being found in great abundance.

70. Genus: **Nicaea** *Moore.*

Rather large moths with medium-sized head, large eyes, short palpi and strong tongue; antennae long with short ciliae in the ♂. Body entirely clothed with dense smooth hair. In the ♂ the much produced apex of the forewing is characteristic, while the ♀ of the single species resembles a *Call. dominula rossica* in shape and colour and has normally-shaped wings. The only species inhabits West China and the neighbouring districts of the Indian Himalayas.

longipennis. **N. longipennis** *Walk.* (18 d). Forewing and apical area of hindwing black with white spots; the remainder of the hindwing bright yellow with black spots. Thorax black, abdomen bright yellow with black dorsal and lateral spots. Everywhere at the Middle and Upper Yang-tse-kiang, in Upper Assam and the Eastern Himalayas, common in many localities.

71. Genus: **Callimorpha** *Latr.*

Medium-sized and very brightly coloured moths, mostly with a strong metallic gloss on the thorax and wings. Head rather small; eyes very prominent; palpi short, upturned, with reduced end-segment; tongue strong; antennae simple, setiform in both sexes. Thorax clothed with dense smooth hair; abdomen slender, in the ♀ cylindrical, brightly coloured and with dark stripes or spots, aberratively sometimes metallic black. Forewing triangular, metallic black-green or black-blue, with white or yellow markings, hindwing oval, red or yellow, aberratively sometimes black. Larvae sparsely covered with short bristles, brightly coloured, hibernating on low-growing plants; pupa small in proportion to the moths, the latter appearing after four or five weeks. The species inhabit Europe and North Asia, and in Kashmir and the Eastern Himalayas enter Indian territory. There is no species in Northern Africa, but a few occur in the Ethiopian region, which however are perhaps better placed into a separate genus.

dominula.
hamelensis.
conferta.
fasciata.
pauci-macula.
marita.
romanovi.
nigra.
nexa.
radiata.
lusitanica.
rossica.
bithynica.
insubrica.
italica.
bieli.
persona.

C. dominula *L.* (= profuga *Göze*, domina *Hbn.*) (18 e). The Scarlet Tiger has black-green glossy forewing, with the spots at the middle and apex of the cell and near the base of the inner margin ochreous and the other spots white. Hindwing deep dark red with a black spot before the apex of the cell and black marginal markings. Abdomen red with broad black dorsal stripe and apex. Throughout Europe with the exception of the Arctic countries and many islands, eastward to the countries around the Black Sea. About 20 varieties have been erected, some being aberrations, some geographical races, and Standfuss has obtained a number of inconstant but highly interesting forms by crossing different races. The spots on the forewing may all be white (ab. **hamelensis** *Pflümer*), without there being any other distinction. In ab. **conferta** *Schultz* the usually white spots on the forewing are confluent. In ab. **fasciata** *Spul.* the spots of the forewing merge together in pairs to form transverse bands. In ab. **paucimacula** *Schultz* the spots are reduced, often being absent with the exception of one. In ab. **marita** *Schultz* the spots of the forewing are absent. In ab. **romanovi** *Standfss.* (18 e) the black of the hindwing is increased, only the base being red, while in ab. **nigra** *Spul.* both wings are black above, ab. **nexa** *Schultz* has the discal spot of the hindwing united with the black colour of the margin, but is otherwise normal. ab. **radiata** *Krodel* has two white radial basal streaks on the underside of the forewing. — Beside these variations, which may occur anywhere, there is a series of geographical races which in some localities are the only form and in others occur among name-typical specimens: **lusitanica** *Stgr.* has the forewing like ordinary *dominula*, but the hindwing is yellow. Singly already in South Germany. — **rossica** *Koll.* (18 e) like the preceding with yellow hindwing, but the spots on the forewing all white and mostly rather larger. — **bithynica** *Stgr.* has all the spots of the forewing yellow or brownish, the hindwing red, with the black like that on the abdomen increased. — In the extreme South-East of the area of distribution **insubrica** *Wackz.*, with the hindwing tinged with yellow, forms a transition from *bithynica* to *italica*. In certain alpine valleys. — **italica** *Standfss.* (= donna *Costa*) has the hindwing very dark yellow, sometimes strongly reddish, while the spots of the forewing are larger; in Central and Upper Italy, where it is locally constant. — **bieli** *Stgr.* is a very conspicuous form in which the spots of the forewing are all orange-yellow and the hindwing light red-lead colour tinged with yellow tinge; North Portugal near Oporto. — Lastly, the very variable form **persona** *Hbn.* (= donna *Esp.* nec *Costa*, domina *Hbn.*) (18 e) must be mentioned, with small spots on the forewing and yellow hindwing, the latter in the outer half entirely black like the abdomen. — Larva blackish grey with broad sulphur-yellow dorsal stripe interrupted and marked with black, and with minute yellow and white spots laterally. The warts have a bluish gloss and bear short hairs. Until the beginning of May on low-growing plants, especially Cynoglossum. Pupa reddish brown, sometimes two or three in the same cocoon. The moths in June and July, often but not regularly flying by day in the sunshine, visiting flowering lime-trees. Very common in most localities; the larvae are best collected in the early spring directly after hibernation.

philippsi.

C. philippsi *Bartel.* The moth is said to resemble *quadripunctaria*, but according to the author the white bands of the forewing consist of spots recalling the markings of *dominula* and the black spots of the hindwing are much enlarged. Kusch, Russian Turkmenia (?). Unknown to me (aberration of another species?).

quadri-punctaria.

C. quadripunctaria *Poda* (= hera *L.*) (18 f). The Jersey Tiger, generally known under Linné's name of *hera*, has a greenish black forewing banded with white, the hindwing in typical specimens being bright vermilion with three black spots at the apex of the cell and before the outer margin. Throughout Europe with the exception of the North and Western Asia, from England and Western France to Persia and from Livonia and St. Petersburg to the Mediterranean; also mentioned from Egypt, but probably only in the

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[1] At Darmstadt, according to the kind information received from Herr Wilbrand, on an average one specimen among 200 red ones.

district bounding on Syria, if this record is not erroneous. — While the specimens from near the northern boundary of the area (e. g. at Crefeld, in the Harz mountains and Northern Russia) are usually not larger than *dominula*, there occurs in the South at Digne, Clausen, in Dalmatia, etc., a large but otherwise not *magna.* different form, which has long appeared in collections and dealers' lists as **magna.** — In Syria, especially *fulgida.* in the Lebanon, at Adana, etc., a similar form occurs, as large as *magna*, this is **fulgida** *Oberth.* (18 f), which is distinguished by the narrow stripes of the forewing and especially by the fiery red colour of the hindwing, which is much deeper than in *magna*; moreover, the black spots on the hindwing are larger. — The red colour of the hindwing may also turn to orange; this form, which occurs especially in Brittany, *saturnina. lutescens.* is called ab. **saturnina** *Oberth.* (18 f). It forms a transition to the form ab. **lutescens** *Stgr.* (18 f), likewise not uncomon in Northern France, but occurring also elsewhere, with strong stripes on the forwing and light yellow hindwing. — A varying reduction in the white stripes of the forewing has repeatedly been observed and has given occasion for proposing various names (*nigricans Kempny, medionigra Spul., perfusca Bast., costimacula Spul.*). Lastly the stripes of the forewing may be present, but changed in colour; this *brunnescens.* is the case in ab. **brunnescens** *Spul.* — Larva dark brown-grey, with orange warts and dorsal spots and brown and rather short hair; fine yellow irroration laterally; head black. Hibernates when young, and lives until June on low-growing plants, but also likes to feed on tender shoots of oak. Pupa dark brown, in a loose cocoon. The moths appear at the end of July or in August, and fly in daytime in quarries and rocky places. In some years they are exceedingly abundant; they visit Umbellifers, Scabious, Watermint, Echium and other flowers, especially at brook-sides. In the North of their area they are becoming rarer in many localities, or are on the verge of extinction, e. g. at Frankfurt a. M., Mainz, Darmstadt, Hamburg, St. Petersburg, etc.

menetriesi. **C. menetriesi** *Ev.* (18 f). Forewing black with yellow radial streaks several times interrupted. Hindwing orange, with the black veins partly much broadened. Head, collar and costal margin of hindwing purple-red. From Sungary.

plagiata. **C. plagiata** *Walk.* (18 g). Head and thorax yellow marked with blackish brown; abdomen yellow with black bands. Forewing dark black-green with very dense white spots in the outer half, the basal half more sparsely covered with oval ivory spots. Hindwing bright yellow, with very variable black markings. In the Himalayas, from Kashmir to South China, common in many localities.

histrio. **C. histrio** *Walk.* (18 g). Like the preceding species in colour, but the white spots are arranged differently in the outer portion of the forewing; the four apical spots small, not forming a regular row with the subapical band of spots. In North and Central China and Corea.

principalis. **C. principalis** *Koll.* (18 g). Forewing metallic blackish green, with dispersed yellow or ivory-white spots; hindwing bright yellow, with black spots before the margin and at the apex of the cell, and also as in *menetriesi* traversed by broad black veins. In facies resembling the preceding forms, but at once distinguished by the blood-red body being broadly marked with black dorsally. In Kashmir, widely distributed *regalis.* in the Himalayas; the lighter and larger form **regalis** *Leech* extends as far as China. In the smaller **fedt-** *fedtschenkoi.* **schenkoi** *Gr.-Grsh.*, from Pamir, the spots on the forewing are paler, the hindwing also light yellow, the veins black-brown without any dark shading.

equitalis. **C. equitalis** *Koll.* (18 g). Body as in the preceding species, to which it is closely allied, blood-red with black markings; but the forewing spotted with white to a very variable degree, and the hindwing with white ground-colour, bearing sometimes more, sometimes less numerous grey-brown spots. Kashmir; distributed over a large part of the Himalayas, and especially in the northern valleys, as far as Sikkim in India; not rare.

8. Subfamily: **Nyctemerinae.**

This group, the chief genus of which is the Indo-Australian-African *Nyctemera*, is by many authors considered a separate family, but by others placed with the Arctiids, especially with the *Lithosiinae*. Herrich-Schäffer first placed the species of his genus *Nyctemera* with the Liparids, but they had to be separated from the latter on account of their ocelli. They may, however, be regarded as transitional forms in as much as similar tufts of hair as those of the larvae of Liparids have been observed in the Nyctemerids. They are distinguished from the larvae of Arctiids by the otherwise rather sparse hair. In contradistinction to the polyphagous *Arctiinae* they are usually monophagous. I found the larva of the Australian *N. conica* only on Senecio, and only Senecio is mentioned for *N. annulata* from New Zealand. The venation is distinguished by an areole in the forewing. The moths are conspicuous in colour, and like many protected insects fly by day in the sunshine.

72. Genus: **Hipocrita** *Hbn.*

This genus only contains one species, which is at the same time the only species of *Nyctemerinae* which is a member of the European fauna. The moderately small moth is bright red; head rather large, with flat frons, large eyes, quite short and porrect palpi, aborted tongue and the antennae with very short ciliae. The abdomen of the ♀ is stout, cylindrical, that of the ♂ slender and hairy. The larvae are very brightly coloured, with sparse hair, and feed on Senecio; pupae very glossy, stumpy, immobile, on the ground. The moths fly on stubble, pastures and alpine meadows.

jacobaeae. **H. jacobaeae** *L.* (= senecionis *Godt.*) (18 h). Forewing grey: inner margin, a stripe below the costal margin, two marginal spots and the hindwing purple-red. Europe and Western Asia to the Altai. In *gilleti.* ab. **gilleti** *André* (= confluens *Schultz*) the red markings of the forewing are more or less confluent. In *fulvescens. flavescens.* ab. **fulvescens** *Spul.* the red is replaced by orange-yellow, and in ab. **flavescens** *Thierry-M.* by pale yellow. *grisescens.* In ab. **grisescens** *Spul.* the hindwing is grey. — Egg yellow. Larva with yellow and black rings, the head black marked with yellow, and the hairs sparse and brownish; on Senecio vulgaris, S. paludosus, said to feed also on Tussilago; full-grown in July and August. Pupa black, glossy, in a cocoon on the ground; the moth in May and June, on meadows, flying by day when flushed; settles on stalks of grass. Common everywhere.

73. Genus: **Hyalocoa** *Hamps.*

This genus also contains only one species, which was formerly placed with *Hipocrita.* But the areole is absent, and it is doubtful whether the genus ought to be placed here at all. Head small; eyes very large; palpi small; tongue quite aborted; antennae simple, thorax and abdomen very slender in the ♂, in the ♀ stouter, short and rather club-shaped; wings comparatively broad, very thinly scaled. Nothing is known of the early stages; the only species inhabits East Asia.

diaphana. **H. diaphana** *Ev.* (18 h). Sooty grey-brown; head and thorax darker, collar bright reddish yellow, abdomen paler yellow, in the ♀ with dark dorsal spots in the middle. Wings without markings, diaphanous grey-brown. Seems rather rare, in Amurland and near Irkutsk, in May and June.

74. Genus; **Hyperborea** *Gr.-Grsh.*

This genus contains one East-Asiatic species resembling *Parasemia* in facies. Slender, with small head, short palpi, simple antennae, large tegulae, slender abdomen, broad triangular forewing and large, almost circular hindwing.

czekanowskii. **H. czekanowskii** *Gr.-Grsh.* (18 h). Forewing grey-brown, semitransparent; a white costal stripe, another above the inner margin and two crossed stripes in the outer area; the veins are also white, narrow, and sharply defined. On the hindwing the margin is irregular, grey-brown, and before it, on the semidiaphanous ground-colour, are two spots below the apex and above the anal angle. From the Tunguska River.

75. Genus: **Nyctemera** *Hbn.*

Moderately large, slender moths, usually black and white in colour with simple markings. Head rather large, on a long constricted neck; eyes prominent; ocelli present; palpi moderately long, porrect, with thin end-segment. Tongue developed. Antenna of ♂ pectinated. Thorax thin, tegulae spotted, abdomen of ♂ slender, in the ♀ cylindrical, usually with dorsal spots, very smoothly scaled. Wings broad, usually white with dark edges, forewing with distinct areole. Larvae as far as known yellow or red with dark rings, some with tufts of hair, many living on Senecio. Pupa smooth, thin-skinned, in a loose cocoon; before the moth emerges one can see the spots of the thorax and abdomen shining through. The moths are on the wing in daytime, their flight being restless; they seem to be protected; I saw a dragon-fly which had caught a *N. conica* let it go again after a few seconds. Pagenstecher, who monographed the genus, enumerates about 80 mostly Indo-Australian forms. Only two forms extend to the Palearctic Region at its southern boundary.

plagifera. **N. plagifera** *Walk.* (18 h). White with blackish brown discal and marginal markings. Thorax and abdomen spotted with black, tip of the latter and the head yellow. Common throughout India, northwards to Tibet, China and Formosa. In warm districts during the whole year, in the Palearctic Region more in the autumn, flying together with *Pieris canidia,* from which it can scarcely be distinguished when on the wing.

lacticinia **N. lacticinia** *Cr.* (18 h). Thorax anteriorly yellow spotted with black. Forewing black-brown with white oblique band before the apex rounded at both sides, and a white stripe basally at the inner margin. Hindwing white, semivitreous, with broad, proximally irregular, marginal band. Throughout India, Southern China and Formosa. Larva grey, dorsally red, this colour being interrupted by tufts of hair situated on warts; at the sides of the head two porrect tufts of hair; found on Cacalia conchifolia. Common.

Alphabetical List

of the Palearctic forms of *Arctiidae*, with a reference to the original descriptions.

*) signifies that the form is figured at the place quoted.

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Correction.

To **Endrosa aurita**, p. 60:

The smoky brown variety of this species was described by HAMPSON as **brunnea** (not *fumosa*) and hence must bear this name.

5. Family: **Lymantriidae.**

The Lymantriids, better known under the name of *Liparidae*, are a family not very numerous in species, which in the Palearctic region is widely distributed, especially in the south and east, while the number of species quickly diminishes as we go north; scarcely one-fourth of the species found in South Scandinavia occurring north of the Arctic circle. The Lymantriids are an exception in purely Arctic districts; there occurs for instance only one species of *Dasychira* in Greenland and another in Arctic America. In the frontier-districts of the Indian region the number of species is considerably increased because here true Palearctic forms are intermixed with Indian ones which extend northward, and on account of this many species must be dealt with as Palearctic whose true home is India. The nearest relatives of the Lymantriids must be looked for among the Noctuids, and since these come very near to the Arctiids, as is well known, also among that family. The larvae also show close affinity with the large Noctuid stirps, while the larvae of the Notodontids for instance, the moths of which in many points resemble Lymantriids, strongly deviate from the latter. There occur therefore unmistakable transitions to the Noctuids, e. g. the African genera *Homalomeria Wallgr.* and *Synogdoa Auriv.*, which in facies are Lymantriids, but in venation Noctuids. Lymantriids which strongly resemble Arctiids are for instance *Numenes*, while *Cispia* resembles the Hypsids. The Pterothysanids also belong to the allied families, although they are easily recognised by the absence of a frenulum. In deducing the relationship of the families of Lepidoptera the position of vein 5 in relation to 4 and 6 is particularly important.

The Lymantriids are usually small or medium-sized moths, inconspicuous in colour, being generally white or yellow, more rarely grey, brown or black; often they are entirely without markings or only bear single spots or streaks; more rarely they are vividly marked with black and white (*Lymantria*), or with reddish yellow on a dark brown ground (*Orgyia*). The hindwings are usually without markings. The forewings are broad, rounded at the apex, most species being hairy at the inner margin. When the insect is at rest the wings are placed flat in roof-shape, and in the ♀ are sometimes aborted. Even when they have wings the ♀♀ are always more sluggish than the ♂♂, the latter sometimes flying by day (*Hypogymna, Aroa, Orgyia*).

The head of the Lymantriids is small; the eyes naked; ocelli sometimes absent; tongue very short or quite vestigial; antennae not long, in the ♂ bipectinate to the tip (the teeth also sometimes with long bristles at the end), in the ♀ with short pectinations or only serrate. Palpi never large, but usually with a distinctly separated end-segment. Legs usually short, with long woolly hair, and bearing median and apical spurs or only apical ones. Thorax strong and hairy. Abdomen of ♂ usually slender, not extending beyond the anal angle or only a little, with anal tuft; in the ♀ often clumsy and stout, with much anal wool, and never extending far beyond the anal angle. In the forewing vein 1 c is absent, while 1 a and 1 b do not anastomose, 5 originates near the hind angle of the cell, therefore nearer 4 than 6 (by which it is distinguished from the Notodontids for instance), 7, 8, 9 and 10 usually stalked, an areole often present. Hindwing with two inner marginal veins, 5 originating nearer 4 than 6, 8 free from the base, almost touching the cell in the middle and being connected with 7 by a transverse vein. Frenulum always present.

The almost globular eggs are usually nearly or quite smooth, not so high as they are broad, flat or slightly hollowed at the top; they are often deposited in batches covered with the anal wool. Many larvae are distinguished by bearing a funnel-shaped wart dorsally on segments 9 and 10 which can be reversed in cone-shape. These larvae (larvae mobilituberosae) have 4 well-developed prolegs and anal claspers, on the middle segments brushes of hair and 6 or 8 warts with radiating hair on each segment, beside the funnel-warts mentioned above. The larvae of European *Lymantriidae* may be classified as follows: a) those with large star-shaped knob-like warts (*Hypogymna, Lymantria, Ocneria*); b) with brushes on the middle segments and pencils at both ends of the body (*Orgyia, Dasychira, Laelia*); c) without brushes but with tufts of hair and long lateral hairs or scutiform spots (*Stilpnotia, Arctornis*); d) with small hairy warts and with a smaller hairy tubercle on segments 4 and 11 (*Porthesia*).

The funnel-shaped warts are said to serve as defensive organs against the attacks of Ichneumons, etc., probably giving off a nauseous scent imperceptible to us. They are reversed by the pressure of the blood and retracted by muscular action. In some species (e. g. *Lymantria monacha* and *concolor, Hypogymnia morio*) they are quite small. They are known from several Indian species, e. g. *Euproctis plana, vitellina, guttata* and *scintillans, Laelia exclamationis, Dasychira inclusa* (*dalbergiae*), etc., while in the larvae of some Indian *Dasychira* they are said to be probably absent. The hairs of the before-mentioned tufts and brushes is spun into the cocoon by the larva, and in some species produce an inflammation on the human skin. The hairs of young larvae of *Lymantria* are distinguished by bladder-like swellings (aerophores), whereby the specific gravity is diminished and the possibility of the larvae becoming dispersed is increased. Most larvae of Lymantriids are short and stout, and in the dense covering of hair resemble the larvae of tiger-moths. They live more often on trees than on herbs and usually hibernate as larvae; the cocoon is sometimes double and the pupa is slender (pupa obtecta), soft-skinned and sometimes very hairy. The larvae of the ♂♂ are often smaller than those of the ♀♀. When touched the Lymantriid larvae do not roll up and are mostly rather sluggish. Exceptionally (e. g. in *Lymantria dispar*) they are cannibals.

Some of the *Lymantriidae* are the insects most noxious to cultivation, especially notorious being the Black Arches (*Lymantria monacha*) and the Gipsy moth (*L. dispar*) (the name *Lymantria* meaning destroyer). Gynandromorphous specimens have frequently been observed in *L. dispar,* and lately B. BRAKE has bred whole series of interesting gynandromorphs by crossing allied races. The Lymantriids usually hibernate as larvae.

The position of the wings differs sometimes rather considerably even in otherwise closely allied species, as e. g. *Arctornis l-nigrum* and *Stilpnotia salicis.* The wings of several species bear poisonous hairs.

It is not always easy to distinguish the different species of these insects. In many cases it is possible to find new characteristics not as yet known or taken into account, e. g. the anal tuft of the ♀ of *Euproctis chrysorrhoea* consists of simple thin filiform hairs, while in *E. transversa Moore* from Java it is formed of broad lanceolate scale-hairs, so that these two species can without difficulty be distinguished by the anal tufts alone.

The most notorious among the noxious Lymantriids is the ,,black arches" moth (*Lymantria monacha*). The species is generally comparatively sparse even in forests which are unusually favourable for their rapid increase, but when they once begin to multiply their number grows astoundingly in a few years. The moth is not remarkably fertile, only laying about 100 eggs, but all the same the number of offspring of a single specimen after 5 generations is said to reach four or five millions, even apart from the large number which have in the meanwhile been destroyed by various enemies. Many remedies for getting rid of this plague have been tried in vain; even infecting them with fungi has met with little or no success. But many larvae perish from a natural disease caused by fungi. It also appears that after some time the persistent increase of specimens in one locality is arrested by the disparity in the number of specimens in the two sexes. At the height of such a devastation, migrations of large swarms of this moth have frequently been observed, the insect thus often invading far-off districts which until then had remained free from attack. Such migrations also occur among other Lymantriids, e. g. *Stilpnotia salicis.* In consequence of their habit of coming down the trees and crawling up the stems of others it is possible to mitigate the destruction by putting limed rings around the trees. Another of our most noxious species of *Lymantria, L. dispar,* was in 1868 or 1869 introduced into N. America, where it since 1879 occurs in immense numbers and under the name of Gipsy moth has become known as one of the worst insect-plagues, being there much worse than in Europe. From 1889 to 1897 no less than 750 000 dollars were granted by the government of the States for the destruction of this insect.

Among the parasites of the Lymantriids one of the commonest is Pimpla instigator, which infests the pupae of *Ocneria, Porthesia,* etc.

Lymantria dispar is a favourite subject for research on questions relating to sexual distinctions, as e. g. experiments in castration. The larvae of *dispar* are an ideal subject for such experiments, and on account of the strong sexual dimorphism the fully developed moth is also very suitable for this purpose, all the more because the species is particularly interesting on account of the frequency of gyandromorphous specimens. By these experiments in castration the following results have been obtained, inter alia, which are doubtless of wider bearing or may even be of general application. The size of the genital glands and the capacity of the abdomen are correlative. But castration has no effect whatever on the secondary sexual characteristics, the genital glands not at all influencing the development of the secondary sexual characters. These glands do not influence the characters of the regenerated wings, nor has castration any influence whatever on the psychic differences of the sexes (OUDEMANS, MEISENHEIMER.)

We divide the family into two groups, viz.: *Areolatae,* in which an areole is often present, and *Inareolatae* in which it is always absent. Whether the areole is present or not has no great significance, as in some species both is the case, the areole being sometimes present in one wing, absent in the other.

We understand therefore under *Areolatae* those forms in which an areole can be present, this possibility being recognisable by the following peculiarities: The rule without exception is (at least in those insects which interest us) that vein 10 takes part in forming the areole; but this is only possible when it originates from the cell, i. e. from the anterior margin of the cell, never when it branches off from vein 9. In the latter case the base of vein 10 is already distant from the cell and therefore this vein cannot become connected with the cell by curving or branching so as to form an areole.

I. Group: **Areolatae.**

1. Genus: **Lachana** *Moore.*

Small and rather dark, long-hairy insects with short palpi which are not visible from above; the antennae with long pectinations; minute end-spurs at the middle and hind tibiae; an areole in the forewing, and in the hindwing veins 3 and 4 stalked. Only one species.

L. ladakensis *Moore* (19 a). Hair grey on head, brown and black on body. Forewing greyish *ladakensis.* yellow with brown dusting and three narrow curved darker transverse bands and dark transverse spot on the discocellulars. Hindwing dark brown. Expanse 28 mm. Kashmir.

2. Genus: **Varmina** *Moore.*

This genus contains only one small rather hairy species with small and porrect palpi, the legs being without spurs. Abdomen (♀) with large anal tuft. Areole large, vein 6 of forewing distinctly separated from vein 7 at the base, vein 3 and 4 of the hindwing originating at the angle of the cell, but not from a point. Forewing sharply pointed, with oblique margin.

V. indica *Walk.* (22 a), from Kashmir, has in the ♂ a black body, with grey and brown hairs on head *indica.* and thorax; forewing blackish with orange spots; marginal area grey, with wavy inner edge and with a submarginal row of black dots; in the middle and at the apex of the cell a deep black spot edged with light grey. Hindwing black. The ♀ has the head covered with white hair, and has light ochreous collar and anal tuft as well as lighter wings. ♂ 32, ♀ 42 mm. — Larva black with white spots, dorsal and lateral warts reddish yellow, the anterior and posterior ones with reddish tufts and the central warts with greyish ones, segments 4 and 11 with long black dorsal pencils.

3. Genus: **Dasychira** *Steph.*

Closely allied to *Orgyia*, but altogether larger and clumsier insects, having in both sexes fully developed wings, narrower and more oblique-margined wings. Femora and tibiae with long downy hair, forelegs hairy and porrect when the insect is at rest. Hindtibiae with only end-spurs. Abdomen of the ♀ extending beyond the anal angle of the hindwing. — Larva with tufts of hair on the 4th and following segments, a pencil of hair on the 11th and usually two similar ones laterally on the first segment. The *Dasychira*, with the exception of a few Arctic species (*rossi* and *groenlandica*), are confined to the Old World, but here over 50 species are distributed over 3 continents. Some species are exceedingly common and their long-hairy larvae are often among the most conspicuous insects, even coming into large towns. Many occur commonly only in certain years, and may increase so as to become injurious. The moths are adapted in colour to their environment and are thereby much protected, so that one sometimes rarely finds the moths of which the larva belongs to the commonest insects. The genus is conceived differently by various authors. If one includes all the strongly deviating small forms which Butler, Mabille and Saalmüller place in the genus, Madagascar has an abundance of species, this island alone containing a quarter of all the known species.

D. selenitica *Esp.* (= lathyri *Hbn.*) (19 e). Ground-colour of forewing of ♂ pale ochreous, in the ♀ *selenitica.* whitish, but the latter with such dense markings that nothing is seen of the ground-colour but a narrow sinuose submarginal band, a discocellular spot and a longitudinal ring-shaped spot at the inner margin, the remaining area grey, partly with yellowish and brown dots; a narrow light grey band bounding the basal area on the outside usually distinct. Forewing of ♂ with white discocellular spot and a similar spot at the inner angle, and with grey-brown spots and transverse bars. Hindwing in both sexes black with yellow fringes and in the ♂ with yellow discocellular bar. From Germany and Austria through Russia to Finland, and from Hungary westward across the Rhine, but sporadical and entirely absent in many localities. — The green eggs are covered with anal wool by the ♀. The larva appears in June; it is blackish above, with long dense hair and three long black tufts two laterally on the first segment and one on the last segment. The dorsal tufts brownish, black above. It is found until October, before hibernation, very abundantly at many places, usually on sandy soil, and feeds on low-growing plants, especially on Leguminosae, e. g. Lathyrus, Sarothamnus, Vicia, Trifolium, but also attacks trees, which it is said to have damaged. After hibernation it pupates in April, without having taken much food. They then are much rarer than in the autumn, and are very difficult to rear, often not a single moth being obtained from large quantities of larvae. According to a wide-spread opinion the larva needs large tracts of sand in order to find a suitable spot for pupation and, if it cannot find one, runs about without pupating until it dies. Even in Nature a great many larvae appear to die before pupating. Pupa reddish brown, with yellowish hair (especially dorsally), with darker markings, in a grey-brown ovate cocoon on or in the sand. The moth in May and June, usually not common, even rare in localities where the larvae are found in huge quantities in October, e. g. at Erfurt, Frankfurt a. M., Regensburg, etc.; only in some years commoner.

albodentata. **D. albodentata** *Brem.* Thorax and forewing ashy grey, almost unicolourous, with the exception of a white flexuose sublimbal line, which does not or scarcely reach the costal margin. A dark transverse band bounding the basal area distally, projects as a sharp tooth in the centre, and a dark discocellular spot is indicated; at the costal margin two indistinct oblique transverse grey spots. Upperside of hindwing and underside of both wings lighter grey, beneath with indication of a darker discocellular spot. Fringes of the hindwing spotted with white. From the extreme south of the Ussuri district. — *olga.* **olga** *Oberth.* (19 g) is said to be a form of this species, with both wings in the ♂ almost entirely black, bearing a greyish white, rather large, triangular or almost trapeziform costal spot. The ♀ has greyish brown wings with dark dots, a white submarginal line similar to that of the name-typical form; the inner edge of the marginal area is formed by a black acutely dentate transverse line and a black transverse line also runs across the centre of the wings forming a sharp point directed basad in the centre. The basal two-thirds of the costal area of the forewing whitish, bounded posteriorly in the basal half by a black longitudinal streak. A discocellular spot is indicated. South-East Siberia. — The larva of *olga* feeds on maple. The moth appears in the autumn.

fascelina. **D. fascelina** *L.* (19 f). Forewing ash-grey, lighter at the costal margin, with black and yellow irrorations, the median area bounded on the inner side by a regularly curved dark transverse line and on the outer side by a similar one twice or three times broken; both lines being most distinct at the costal margin. Hindwing grey or whitish. — Larva blackish grey with yellowish hair, the dorsal bristles yellow laterally. Pupa black-brown in a blackish cocoon. Distributed from Arctic Norway to Bilbao and Piemont and from England and the Atlantic coasts to the Altai and Mongolia. — While the normal size varies from 40 mm. (♂) and 50 mm. (♀), a form figured but not named by Herrich-Schäffer for *proletaria.* which I propose the name ab. **proletaria** *Strand* nom. nov., does not attain more than 29 mm. in the ♂; it is also distinguished by the ground-colour of both wings being olive-grey, with the two transverse lines rather indistinct and not reaching the hindmargin, while the discocellular spot is more conspicuous than in true *fascelina.* — *medicaginis.* **medicaginis** *Hbn.* is darker in the ♀. Forewing black-grey, the light costal area only indicated at the most, but the sharply defined discocellular spot situated in a white patch from which extend long acute prolongations directed marginad; the outer transverse band is broad and distinct, the inner one diffuse; both dusted with rusty yellow. Hindwing dark grey, with a submarginal row of dark smears. — *laricis.* **laricis** *Schille* is an almost uniformly ash-grey form with scarcely any black or white irroration, with shortened and obsolescent transverse stripes, living on larches, while the name-typical form lives on leaf-bearing trees. — *obscura.* The Arctic **obscura** *Zett.* is much darker, with the forewing uniformly black-grey without any markings except the usually indistinct outer transverse line. The larva of this form, occurring in the Arctic region as a typical local variety, but also mentioned from Siberia and Amurland, lives on Salix. — *unicolor.* In ab. **unicolor** *Schultz* (from the Vallais) the forewing is said to be light grey, quite unicolourous without any markings. — *nivalis.* **nivalis** *Stgr.*, which the author suspected to be a "species darwiniana" of the preceding and which is perhaps a distinct species, is larger (♂ 42—46 mm.) and much lighter; hindwing sometimes almost quite white, only in the ♀ somewhat variegated with grey, and dusted with blackish below costally; the light ash-grey forewing bears two obsolescent transverse bands suffused with orange. Antenna of ♂ with longer pectinations and less pointed at the apex than in *fascelina.* Central Asia, in the higher mountains (Alai, Transalai, Hazret-Sultan Mts., near Samarkand, Issyk-kul). — *obscura.* **obscura** *Stgr.* are specimens of *nivalis* from the eastern Tian-shan and the Uliassutai in which the whitish grey forewing is so densely dusted with blackish that the ground-colour is almost superseded; the transverse bands almost obsolete. Hindwing grey with darker median dot and obsolescent submarginal band. — *angelus.* **angelus** *Tschetverikow* also belongs to the group of *D. fascelina nivalis,* but is distinguished from the other forms by the much clearer chalky white colour of the forewing, which bears a strongly developed black discoidal spot, and by the hindwing being dirty white with a dark median spot and dark outer band. Occurs in the southern foothills of the Sajan Mts., Northern Mongolia. ♂ 37 mm. — Egg of *fascelina* whitish, covered with wool; larva blackish grey, the tufts at the sides of the thorax and on the end-segment long and black; the rest of the body covered with grey hair, the dorsal tufts whitish black above. When long exposed, especially after hibernation, the dorsal hairs acquire a sulphur-yellow tinge, but this always vanishes after the moult. The larva feeds on all kinds of low-growing plants, especially on Sarothamnus, but also attacks various deciduous shrubs; it may be fed up on lettuce, hibernates when one-third grown, and pupates at the beginning of June in a blackish grey cocoon intermixed with the hairs of the larva, the pupa being clothed with brownish hairs dorsally. The moth from the end of June to August, very well concealed and difficult to find in daytime. The larvae are common almost everywhere, but are not so abundant as is often locally the case with *selenitica*.

fortunata.

D. fortunata *Rogenh.* (19 g) is most closely allied to *fascelina*, but is distinguished from it by the more elongate body, slenderer build, especially the shorter and slenderer abdomen of the ♂, darker colour and different markings, the transverse stripes of the forewing being especially much more acutely dentate and without the yellowish patches of scales of *fascelina*. The pectinations of the antennae of the ♂ of *fascelina* diminish in length much more strongly towards the tip. Canary Islands. — The pale yellowish green eggs are deposited in rounded clusters sparsely covered with wool on the needles of Pinus canariensis, the foodplant of the larva. The latter is black with two narrow yellow dorsal lines, and on segments 4 to 8 dense white dorsal tufts of hair, on segments 1 and 11 black pencils of hair. Pupa reddish brown with three ochreous spots and yellow hair; cocoon ovate, among pine-needles in a dirty brown web. At Las Palmas the moths were observed in large numbers in the autumn, the ♂♂ swarming like those of *Lymantria monacha*, and being pursued and devoured by the Asilid fly Promachus latitarsatus, while the ♀♀ rested on the shady side of the trunks. As the larvae, pupae and moths appeared in great abundance at the same time, the period of flight does not seem to be sharply defined. The insect is so common as to be noxious.

abietis.

D. abietis *Schiff.* (19 g). Forewing very brightly marked with greyish white and blackish grey, the transverse bands and discoidal spot black, the wavy line in the marginal area white. The white colour is most prominent in the basal area and in the basal half of the costal area. Thorax dark brown with whitish sides. Head whitish. Abdomen and hindwing in the ♂ dark grey-brown, in the ♀ whitish. From South Sweden and Russia to Central and South Germany, and from the Carpathians through Bohemia and Lower Austria to South-West Germany (Bavaria and Baden), but absent from large districts; sporadical and mostly rare. According to Spuler Austrian specimens are whiter than South German ones, and northern individuals have the wings less bright in colour with narrower markings. The name **mediobscura** *Schultz* has been given to a ♀ in which the median area of the forewing is much darker, so that the various darker transverse bands which are usually present are scarcely recognisable. — Egg light greenish, larva light green with black segmental incisions, black and white spots and reddish brown-yellow dorsal tufts which are lighter at their bases, the tufts of hair of the first segment black, of the 11th segment brownish yellow. From the autumn until the spring on conifers. Pupa glossy black, with brown hairs, especially dorsally, in an ovate grey cocoon. Moth in June and July. The larvae are beaten in the autumn from the branches of fir-trees overhanging the roads and are best kept during the winter sleeved on firs protected by a roof, which however is not always a success. Forcing, by which the moths may already be obtained in the autumn, is also frequently a failure. One must be careful to pick out the most tender fir-needles for the small larvae, as they cannot eat older, harder needles; they leave the egg in August or September.

mediobscura.

pseudabietis.

D. pseudabietis *Butl.* (= pryeri *Butl.*) (19 h). From Japan. ♂ brown-grey or blackish, the basal area of forewing, which extends twice as far marginad at the costal as at the inner margin, is silvery grey, but so densely dusted with dark that the ground-colour is partially concealed, and in the marginal area there is a silvery white narrow transverse band or line. Between this band and the margin a row of black spots, often confluent, and the fringes are indistinctly spotted with black. In the median area the angulate discocellular spot only indistinct. Hindwing with lighter inner margin, and the fringes spotted with greyish white. Underside whitish, with black discocellular spots, and greyish discoidal area on the forewing; 50 mm. ♀ greyish white with the hindwing slightly darker, forewing rather densely dusted with black, an almost straight black transverse line in the basal third and an abbreviated black transverse mark about midway between the cell and the margin; the discocellular spot large and halfmoon-shaped. Fringes of both wings white with black dots. Underside of hindwing with conical grey discocellular spot. — **argentata** *Butl.*, from Japan, is said to be closely allied to *abietis*, but probably belongs to *pseudabietis*; it is silvery white in the basal third of the forewing and at the outer margin, otherwise with a grey smoky brown ground-colour entirely covered with zigzag or wavy dark black lines, of which those bounding the basal and marginal areas are the most distinct. Hindwing whitish towards the base, otherwise the ground-colour like that of the forewing, with dark grey discocellular spot and marginal band. Thorax greyish white, on the tegulae a black spot and on the metathorax a black transverse band. Underside of wings whitish brown with grey discocellular spot and discal band. ♂ 48 mm.

argentata.

pudibunda.

D. pudibunda *L.* (19 d). ♀: Forewing greyish white dusted with dark, and bearing dark wavy transverse lines edged with pure white on the inner side. Hindwing white with indication of a dark submarginal band. ♂: Forewing olive-grey, with black median area and darker indistinct slightly wavy transverse lines in the marginal and basal areas. Hindwing greyish yellow, with a transverse band which is slightly more distinct than in the ♀, and sometimes forms an elbowed anal spot. In Europe, from Southern Scandinavia to the northern districts of South Europe, also in Asia, where it is probably distributed over the greater part of the Palearctic *juglandis.* Region, being known from Armenia (?), Syria, Amurland, Ussuri, North-East China, Japan. **juglandis** *Hbn.* denotes a form which is rather strongly divergent in the ♂, being distinguished by a greyish white head and thorax (in typical specimens this is dark brown or only slightly lighter), as well as by a whitish basal area of the forewing. The median area is grey with blackish discocellular spot and marginal lines; hindwing with distinct dark submarginal band and discocellular spot. In the ♀ the submarginal band of the hindwing is also more *concolor.* distinct than in typical specimens. ab. **concolor** *Stgr.* (19e) has dark grey forewing, unicolorous or with only traces of transverse lines. Said to be rather more common in North Germany, otherwise rare, among true *pudibunda.* — Egg light yellowish brown with dark median spot. Larva usually light lemon-yellow, but sometimes brownish yellow, violet or blackish grey, with deep black segmental incisions, lighter dorsal brushes and red or brown pencil on the 11th segment. It lives from the end of July until October on deciduous trees, especially beeches, and pupates in a yellowish or brown cocoon according to the colour of the hairs of the larva, the pupa, which hibernates, being blackish or reddish brown. The moth appears in the spring and early summer, and rests on boards or tree-trunks. Late in the autumn, but very rarely, single and usually small specimens are met with which have emerged too soon. The moths are not rare. In some years they are so abundant that the larvae denude the trees, but this does not mean any very great damage, on account of the lateness of the season.

modesta. **D. modesta** *Kirby* (= pudica *Stgr.* nec *Moore*) (22 a) is very closely allied to *pudibunda*, but on the whole rather smaller; the two black median lines bounding the median area are more distinct, with shorter teeth, and the outer transverse line is not nearly so much incurved posteriorly as in *pudibunda.* Before the outer margin there is always a row of black spots, but never a whitish transverse marking in the middle of the marginal area; hindwing of the ♂ much darker than in *pudibunda*, and the dark lines on the under side are quite absent or only slightly indicated at the costal margin. The marginal area of the forewing of the ♀ with narrower, straighter and more blackish transverse lines, and the hindwing is whitish with obsolescent dark median spot and black dots on the fringes; there are no transverse bands on the underside of both wings in the ♀. — Larva until the end of August on different deciduous trees; it is so similar to that of *pudibunda* as to be easily confused with it.

lunulata. **D. lunulata** *Butl.*, from Japan, has the forewing silvery grey dusted with blackish, with an oblique black transverse line near the base, which commences with three brown spots edged with black and is followed by a blackish costal spot; a halfmoon-shaped black line stands slightly beyond the centre, and near the margin there is a row of blackish lunules. Hindwing of the ♂ smoky brown, of the ♀ dull white with a dark discocellular spot and two darker discal stripes parallel with the margin, and with a row of dark dots at the margin. Body white, thorax grey, abdomen of ♂ with dark transverse stripes laterally. Pectinations of antenna rusty red. Underside of both wings dull white with dark discocellular spot and a discal stripe forked in the ♂; the ♀ *acronycta.* with dark marginal spots on the forewing. Expanse 53 to 67 mm. — **acronycta** *Oberth.* (19 e), based on specimens from Askold, an island near Vladivostock, has no dark transverse band bounding the median area on the inner side, but in place of it there are at the costal margin two united transverse bars (or a ring-shaped mark), the extramedian transverse line is sharply broken in zigzag shape and the hindwing is *solitaria.* lighter than in true *lunulata.* 54 mm. — **solitaria** *Stgr.* (19 f). The ♀ is larger (70 to 72 mm.), with lighter hindwing, bearing two white transverse bands in the apical half, and two dark spots at the costal half of the forewing. Habitat as in *acronycta* *).

virginea. **D. virginea** *Oberth.* (19 f), from the island of Askold, near Vladivostock, is a white moth with a yellow sheen in parts; expanse of the ♀ 67 mm.; on the forewing above there is an indication of two wavy narrow transverse bands formed of very minute dark speckles. The ♂, measuring only 50 mm., has head, thorax and forewing white; on the last there are two transverse bands as in the ♀, but the outer one is much more distinct. Hindwing and abdomen brown-grey, but greyish white in the apical third.

dalbergiae. In **D. dalbergiae** *Moore* (22 a), from the North-Western Himalayas, the ♂ has dark fawn forewing with dense and minute black dots; in the marginal area a greyish band curved basad at the costal margin, otherwise straight and with a wavy edge on the inner side. Hindwing light grey with dense minute brown

*) Leech (Trans. Ent. Soc. London 1899, p. 125) maintains that *acronycta* does not differ in the least from Japanese specimens; the differences shown by *acronycta* and *lunulata* are explained by the figure of *lunulata* being "a very bad one". But as Staudinger already very correctly pointed out (Mém. Rom. VI, p. 307) the original description of *lunulata* mentions characteristics which do not well apply to *acronycta*, and Staudinger's remark (l. c.) that Leech, who was otherwise a good Lepidopterist, cannot always be relied on in such questions, is likewise well founded.

irroration, indicating a band at the margin. Abdomen above with a row of black spots. 40 mm. Forewing of the ♀ lighter, more greyish, with brown diffused marginal band slightly narrowed anteriorly, in which a row of indistinct dark dots is visible; on the inner side of this band there are three narrow black sharply defined longitudinal spots and a black diffused streak originates from the base of the wing at the inner margin. Hindwing and abdomens light grey. 52 mm. — A peculiar ♂-aberration, from the Kangra Valley, described and figured but not named by MOORE, has a large round snow-white spot near the base of the forewing and the median area bounded by a black interrupted sharply defined line. I name this form **kangrana** *nom. nov.* *kangrana.* — The larva of the ♂ is dark brown, with reddish brown head, two white dorsal lines on the 4th segment and reddish dorsal tufts on segments 4 and 7, while the ♀-larva has dark brown dorsal brushes, a subdorsal white line, and red dorsal spots on segments 9 and 10.

grotei.

D. grotei *Moore* (= kausalia *Moore*) (22 a), from North India and West China, is white in the ♀; forewing sparsely and minutely irrorated with brown, antenna brown. The ♂ light brown-grey above, forewing with thin black dusting and indistinct dark sinuous transverse lines (near the base, middle and margin) and lunular discocellular spot; hindwing light greyish brown, with yellowish inner area; fringes whitish, discocellular spot indistinct, underside lighter; both wings with dark brown dentate discocellular spot and an indistinct discal transverse band. ♂ 46 mm., ♀ 70—80 mm. Larva yellow with long yellow hair and shorter yellowish bristles on segments 4—7 and 11, as well as a deep black spot between segments 4 and 5. The species is often considered synonymous with *Das. horsfieldi Saund.*, from Java, which is scarcely correct.

mendosa.

D. mendosa *Hbn.* (= sawanta *Moore*) (22 d). ♀: Head, thorax and abdomen light brown, the latter often slightly lighter, with a row of black dorsal spots. Forewing brown with a blackish longitudinal stripe from the base to about the middle of the wing; before this stripe the grond-colour is greyish white, with 2 or 3 darker transverse smears, the light area terminating at the discocellular: a diffuse olive-yellowish band runs along the inner margin and as a sublimbal band almost to the costal margin, interrupted by a dark longitudinal stripe. Hindwing above and below light olive-grey. Underside of forewing greyish brown, with brownish yellow costal margin and black curved longitudinal stripe in the apical half, as well as with black spots on the fringes. ♂: Forewing brown, with rounded white subbasal spot edged with dark, light brown discal spot and dark subapical spot, dark subbasal and submarginal lines; hindwing brownish white. The species was first described from Java. Some authors put as synonyms of it no less than 9 *Dasychirae* described later from India, Java, Borneo, Australia and Christmas Island, and which are dealt with in the Indo-Australian section of this work (Vol. X); in fact, however, several of these are evidently good species, as the larva of the collective species *mendosa* is very differently described, from blackish to greyish white. Of these forms three at most concern us, viz.: **fusiformis** *Walk.*, from North India, the ♀ of which has the forewing grey, white in places, *fusiformis.* with two light brown bands, while that of the ♂ is almost uniformly brown, having only a light round spot on the outer side of the subbasal line. — **lanceolata** *Walk.*, *lanceolata.* to judge from the specimen before me from the former ATKINSON-collection, is a smaller form (♂ 29 mm), with light brown forewing which in the costal half is occupied by a greyish white longitudinal band with a wavy posterior edge and not quite reaching the base, and which has two or three brown spots at the costal margin; unfortunately it is doubtful whether this form, which does not entirely agree with the original description, is the true *lanceolata*, and also whether it occurs in our area, the specimen mentioned being from Calcutta. — **basivitta** *Walk.* *basivitta.* is greyish fawn-colour, forewing dusted with black, with four black transverse lines and white discal smear, hindwing ashy grey; it was described from Ceylon, and it is doubtful whether it also occurs in N. India. — Expanse of *mendosa* said to be ♂ 34 to 42, ♀ 46 to 54 mm. Larva black, head striped with red, segment 1 with long black tufts of hair and a white band interrupted by red streaks; laterally red spots, below these a white line; segments 4 to 7 with dorsal tufts of yellow hair originating from a dark spot, segment 5 with a black tuft of hair laterally; 8 to 11 with subdorsal scarlet spots, 11 with long black dorsal tuft; legs scarlet or with scarlet spots. In a lighter form of the larva the whole head and a dorsal spot on segment 1 are scarlet, while the dorsal tufts on 4 to 7 are grey. The moth is not rare.

securis.

D. securis *Hbn.* (= falcata *Walk.*) (22 c). Head and thorax ochreous brown, abdomen ochreous white. Forewing ochreous, posterior half sparsely irrorated with dark, from the base to the margin an obsolescent dark longitudinal stripe. Hindwing ochreous white. ♂ 34, ♀ 50 mm. Larva black, with ochreous and black hair, reddish dorsal tufts and red head and legs, green spots laterally and a green longitudinal line. As also a whitish yellow tufted larva is described as being that of *securis*, it is probable that in this species as in *D. pudibunda*, *mendosa*, etc., the larva varies in colour and may be light straw-colour with dull yellow dorsal brushes and black tufts of hair and head [1]). Throughout India as well as Ceylon,

*) This species has lately usually been referred to as *inclusa Walk.*, or *invaria Walk. D. inclusa* is a form from Java and *invaria* from the Philippines, whose identity with our species from Kashmir appears to me to be very doubtful or more exactly, very improbable. Together with MOORE I therefore treat the present insect as distinct.

Burma, Java, Australia, and said to occur also in Africa.

flavimacula. *yatonga.* **D. flavimacula** *Moore* from India and Tibet. The ♂ of the form first described, from India, has the forewing dark purple-brown with three wavy black transverse lines, a dark lunule bounding a brown smear on the discocellular and a row of dark spots in the marginal area. In the anal angle a whitish yellow sharply defined oblique transverse streak. The hindwing is dark, and the underside of both wings has a postmedian transverse line and a discocellular spot. ♀ lighter, with sharper markings. ♂ 48, ♀ 60 mm. The form from Tibet (Yatung) differs in the shorter forewing with more rounded margin, especially in the ♀, while in true *flavimacula* the forewing is elongate with very oblique margin. I call the form from Tibet **yatonga** *nom. nov.*

tenebrosa. **D. tenebrosa** *Walk.* (22 c). Dark brown, forewing with six indistinct dark wavy lines edged with purplish grey on the outer side, a row of dark lunules in the marginal area and everywhere else a pattern of irregular diffuse separate spots and streaks. All wings with a black discal spot below. Hindwing dark grey. The markings of the forewing of the ♀ less distinct. Forewing with black discocellular spot, while in the closely allied *bhana Moore*, often united with it, there is a large ochreous spot instead. 43 to 52 mm. India, Tibet and West-China.

chinensis. **D. chinensis** *Swinh.* is also allied to D. *bhana*, but the colouring is different and the transverse lines of the forewing are of a different shape. Greyish brown, forewing with greyish white especially in the apical half, the subbasal and the median brown transverse lines sinuous, the discal one dentate and recurved, the submarginal one composed of lunules; at the margin there are lunules with white inner edge and brown longitudinal wedge-shaped spots. Hindwing brown with a vestigial darker discal band; fringes ochreous with brown spots. Underside light olive-grey, with double discal band on both wings and large discocellular spot on the hindwing. ♂ 44, ♀ 56 mm. China (Mupin, Ta-tsien-lu, Kwei-chow).

catocaloides. **D. catocaloides** *Leech* (22 c), from West China, has dark brown forewing partly suffused with yellowish or greenish, and bearing black wavy transverse lines, as well as two or three small greenish spots at the costal margin; the discocellular spot is reniform and edged with black on the outer side. Hindwing orange, with broad black costal and outer-marginal band and a long black wedge-shaped stripe from the base to the marginal band. Underside of both wings orange, with black marginal band anteriorly and on the outer side, and distinct discocellular spot. ♂ 46 mm.

4. Genus: **Hypogymna** *Hbn.*

This genus only contains one European species, slightly resembling the Psychids; the ♂ has a slender body and rather broad rounded wings; the ♀ is stout-bodied with narrow wings, the forewing being one-half, the hindwing one-third the length of the body; in the forewing of the ♀ veins 6 and 7 are absent. Larva with large star-shaped knob-like warts, on grasses; pupa with thin hair, in a loose cocoon.

morio. *natlyi.* *caucasica.* **H. morio** *L.* (19 a). ♂ varying from blackish to grey, with transparent wings; ♀ not able to fly, yellowish grey with yellowish fringes. Smaller, lighter specimens are named ab. **natlyi** *Aign.* From South-Eastern Germany through Austria and Hungary to the Northern Balkan and southward to Central Italy. The records from Southern France, Munich and Dillenburg (Hessen-Nassau) are doubtless incorrect. — On the other hand, in Armenia the form **caucasica** *Heyl.* occurs; smaller, with longer fringes and shorter spur on the foretibia, forewing more rounded. — The eggs are deposited in clusters on stalks of grass. Larva black with yellow longitudinal stripes, the dorsal and ventral stripes interrupted, warts ochreous, with grey hair. From June until May on grasses, especially Lolium. Larvae which pupate early give the moth already in the autumn, but most of the larvae hibernate, their imago appearing in the spring. Pupa in a thin loose cocoon, soft, yellow with brown markings and grey hair. The moths are local, on meadows, usually abundant, often occuring in large quantities in the valley of the Danube, where the ♂♂ are frequently seen flying about briskly in daytime.

5. Genus: **Orgyia** *O.*

Smaller forms, which in the ♂-sex resemble Rhopalocera in the usually bright colouring and the habit of flying in daytime, while the ♀♀ have aborted wings and very stout woolly abdomen; ♀-antenna short with short dentition. The ♀♀ are very sluggish and usually lay their eggs on the cocoon. The species can therefore only be distributed by the larvae. The antenna of the ♂ is bipectinate, the ciliate pectinations being long and bearing at their apex a stronger bristle directed basad. — Larva also brightly coloured, with brush-like tufts and pencils of hair; they live on trees and shrubs and pupate in a double cocoon, the pupa bearing minute hairs. About 50 species are known, being distributed over the entire earth and extending far northward.

O. aurolimbata *Guen.* (19 b). ♂ brownish black with golden fringes; ♀ reddish yellow or brown-grey. Eastern Pyrenees and Catalonia, as well as the Ili and Issyk-kul districts. — In Castile there occurs var. **guadarramensis** *Stgr.*, which is smaller with unicolourous wings and duller fringes on the forewing. — Larva greyish brown with yellow markings, reddish brown dorsal tufts and black pencils of hair on segments 1 and 11. Until May on genista; the moth found in June and July.

aurolimbata. *guadarramensis.*

O. flavolimbata *Stgr.* (19 b). ♂: forewing smoke-black with pale yellow fringes, suffused with a lighter colour below towards the apex and margin; smaller than the preceding species. ♀ entirely without wings, with snowy white hair. Tian-shan and Altai. — According to Staudinger and Rebel's Catalogue **tristis** *Gr.-Grsh.* (from Pamir) is perhaps synonymous mith *flavolimbata*, but it seems to differ more strongly from *flavolimbata* than the latter does from *aurolimbata*, being easily distinguished from *flavolimbata* by being only half the size of the latter (expanse 11 mm, *flavolimbata* 19 to 22 mm).

flavolimbata. *tristis.*

O. ochrolimbata *Stgr.* (= christophi *Alph.*) (19 b), from the South-West Caucasus, is distinguished from the preceding species by the fringes being ochreous also at the inner margin of the hindwing and by the indication of an indistinct lighter and very broad transverse band with dark median spot on the forewing; on the hindwing, moreover, the marginal area only is as dark as the hindwing of the preceding species.

ochrolimbata.

O. panlacroixi *Oberth.* (19 b), from Algeria, has dark brown forewing with a blackish submarginal band, two similar median transverse streaks once elbowed and blackish base; hindwing blackish with lighter band along distal and inner margins. Found in June at Tuelagh.

panlacroixi.

O. gonostigma *F.* (19 a). ♂: Forewing light chestnut with blackish discal spot and transverse lines and whitish spots. The ♀ (a 5) is blackish grey to yellowish grey and is much larger than in *antiqua*. Throughout Europe and Northern Asia, from South Scandinavia and Russia to Corsica, and from England, Belgium and France to Japan. Local, but usually not rare. — In East Asia occurs the form **approximans** *Butl.*; this is similar to *gonostigma*, but the wings are narrower and more acutely pointed, the forewing has smaller spots and only two instead of four or five at the apex; the ground-colour of the forewing darker and the black spots therefore less prominent. Expanse 33 or 34 mm. — Egg round, white with darker centre. Larva black, with light yellow longitudinal stripes, reddish or greyish yellow warts, light ochreous dorsal tufts and black pencils on segments 1 and 11; full-grown in May and June, and again in August, on deciduous shrubs, especially sallow, as well as on young fruit-trees, roses, raspberries and blackberries. Pupa in loose, brownish cocoon; the moths in June and autumn.

gonostigma. *approximans.*

O. antiqua *L.* (19 a) is common from Southern Lapland to the Mediterranean and goes eastward to the Amur; it seems to be absent from Andalusia and the Balkan, but occurs in Northern North America. The ♂♂ vary considerably in colour. var. **modesta** *Heyne*, from Central Russia, is uniformly pale brown with obsolescent markings distally. Another form, also with only slight markings, but light yellowish grey in colour, occurs in the Bukovina; this form, which moreover is larger than West European specimens may be named var. **bukowina** *nom. nov.* The form (ab) **confinis** *Gr.-Grsh.* (22 c), which is darker brown with lighter basal and median area, has been described from the Changai Mts. in Mongolia and from the Kuku-Nor district. Much darker, blackish brown ♂♂ are named ab **infernalis** *Rbl.*, while bright brownish yellow and much lighter specimens are called ab. **dilutior** *Schultz* (described from Germany). — **zimmermanni** *Graes.*, described from two ♂♂ from Blagovechensk in Amurland, is very closely allied to *antiqua*, and seems to be a transition between the latter and *ericae*; it is especially distinguished by the fringes of the forewing not being chequered and by the narrower and more unicolourous forewing, which bears a large greyish white spot in the middle of the costal margin extending inward to the reniform spot, which latter is edged with white at the discocellular; three narrow dark lines traverse the wings, the space between the two inner ones being shaded with dark at the costal margin, while in *antiqua* this part of the wing is usually rather lighter than the rest; in *zimmermanni* the marginal area, moreover, is not suffused with a darker colour as is the case in *antiqua*. — Eggs of *antiqua* whitish, with darker centre and edge. Larva iron-grey, with reddish and whitish yellow markings, yellow or brownish dorsal tufts and blackish pencils on segments 1 and 11; on segments 4 and 5, moreover, there are pencils of hair directed laterad, by which the larva is at once distinguished from that of *gonostigma* and other species of *Orgyia*. Almost throughout the year until September on numerous trees and shrubs, also on maple, plantain and other usually but little favoured deciduous trees. Pupa yellowish grey, darker dorsally, in an ovate yellowish grey cocoon. The moths occur everywhere in the area of distribution, being common in almost every locality until October, the ♂♂ flying by day in the sunshine, their flight being irregular, restless and tumbling; they are found as abundantly in towns as on wood-paths and country roads.

antiqua. *modesta.* *bukowina.* *confinis.* *infernalis.* *dilutior.* *zimmermanni.*

O. trigotephras *Bdv.* (19 b). ♂: Forewing brownish yellow, with a light grey elbowed antemedian transverse line and two spots of the same colour in the costal marginal area, the median one being placed trans-

trigotephras.

versely and pointed posteriorly, while the apical one is elongate-rectangular; between the two a dark brown transverse spot which is dentate on its outer side and sometimes continues slightly narrower to the hindmargin; at the inner angle a small sharply defined white transverse spot. ♀ entirely wingless, with whitish woolly hair; it never leaves the cocoon, in which it also lays the eggs. The species varies strongly, the chief form occurring *anceps.* in South France and on the Iberian Peninsula. — In Algeria and Morocco occurs var. **anceps** *Oberth.* (22 b), which is usually larger and has the forewing sooty chestnut-colour, almost without markings and with only an indication of the transverse line, while the white spot at the hind angle is usually even larger and more rounded than *transiens.* in the main form; hindwing like the forewing without markings. — **transiens** *Stgr.* occurs in South Mauretania as a transition to the following; it is slightly smaller than *anceps* and brighter chestnut with grey costal marginal spots. — Specimens from Calabria in coll. Turati have the forewing already distinctly chequered with *sicula.* reddish brown and grey, and therefore form a transition between *etrusca* and *sicula*. — **sicula** *Stgr.* (22 b), from Sicily, has the forewing greyish chestnut, almost without darker lines, with obsolescent grey costal spot, sometimes with a grey median transverse band and before it a transverse line of the same colour, spot at inner angle *etrusca.* small and yellowish (always?); hindwing usually light chestnut. — **etrusca** *Verity* (22 b), from Tuscany, is distinguished from *sicula* by the costal spot of the forewing and the very distinct and sharply defined extrabasal *corsica.* line and the similar median band. — **corsica** *Bdv.* (19 a), from Corsica and North Africa, questionably also from Sicily, is as dark as or still darker than the principal form and without distinct grey costal marginal spots or other distinct markings, with the exception of the white spot at the inner angle, the reniform mark edged with white and two transverse lines bounding the median area, the proximal one of which has a white inner edge; *ramburi.* smaller than the main form. — I incline to the opinion that **ramburi** *Mab.* is not a mere synonym of *corsica*, as is stated in Staudinger's Catalogue and as Spuler supposes. *ramburi* seems to be slightly larger, still darker, without the reniform mark and without sharply marked transverse lines, therefore also without a well-defined *orientalis.* median area, the spot at the inner angle more rounded. — It is probably closely allied to **orientalis** *Stgr.*, from *prisca.* the Taurus, Syria and Palestine, which is said to be blackish brown. — **prisca** *Stgr.* (22 c), from Ferghana and Mongolia, is probably also closely allied to *trigotephras*, Staudinger and Rebel considering it a questionable „Species darwiniana" of the same. The ♂ is smaller than *antiqua* (23 to 26 mm), with more whitish markings on the forewing and light brown hindwing; there is usually an indistinct narrow reniform spot at the cross-veins edged with grey and above it at the costal margin an often very large grey distinct spot; there is grey dusting at the inner margin forming a half-band and before the whole of the outer margin. ♀ without a trace of wings, with whitish grey hairs. — The eggs of *trigotephras* are quite white; deposited by the fluffy hairy white ♀ in the cocoon, which the ♀ does not leave and in which it dies. Dr. Seitz found the larva of the form *corsica* in Algeria not rarely on Quercus ilex; it is violet grey with yellow longitudinal stripe and red-lead coloured dots, ivory white silky dorsal tufts and black pencils on segments 1 and 11, without the lateral pencils found in *antiqua* below the tufts. From May to July. The ♂♂ fly by day; their flight is more quiet than that of *antiqua*; when pursued the moth at once flies up into the air; from June to August, possibly again in the later autumn.

ericae. **O. ericae** *Germ.* (19 b). ♂: Forewing rusty brown, lighter distally, with irregular transverse lines and whitish irregular spot at the inner angle, and often with a whitish smear in the middle of the costal *antiquoides.* margin (ab. **antiquoides** *Hbn.*); the latter form also appears to differ in the rather smaller size, darker ground-colour and indistinct or obsolete spot at the inner angle, but I cannot ascertain with certainty if the latter characters appear regularly together with the whitish smear at the costal margin. Occurs in North-West Germany, *intermedia.* Belgium, Denmark, Finland, Armenia, Changai Mts. in Mongolia. — In Central Hungary occurs var. **intermedia** *Friv.*, which is larger and darker with more distinct markings, and forms a transition to var. *corsica* of the preceding species, from which it is however distinguished by the much larger size and rather lighter *leechi.* colour. — **leechi** *Kirby* (= prisca *Leech* nec *Stgr.*), described from Chang-Yang, is, although perhaps a separate species, closely allied to *ericae*. The ♂ has chestnut forewing bearing two transverse lines, the inner one being almost straight, the outer one first curved towards the apex and then directed obliquely towards the inner margin. Discal area of wings suffused with a darker shade costally, at the middle of the costa a few white scales and at the apex a white smear. Hindwing dark chocolate brown. Underside light brown suffused with a darker tint. 30 mm. Central and West China. — Egg of *ericae* white. Larva ochreous, variegated with red, with black markings, light yellow dorsal tufts and black pencils behind the head and on segment 11. May until July, on heather and other low-growing plants. Pupa yellowish grey, with yellowish hair and black markings, in a yellowish grey cocoon. The moth on moors, in July and August, locally common.

rupestris. **O. rupestris** *Ramb.* (19 b). ♂: Forewing brown, with indistinct darker spots and three narrow greyish white transverse bands, the proximal one of which is straight and almost linear, the distal one broader anteriorly and not reaching the margin posteriorly; between the two outer ones a greyish white transverse spot at the costal margin; hindwing lighter brown. ♀ whitish grey, with tiny wing-remnants. — Larva blackish, with two reddish yellow irregular dorsal lines, blackish dorsal tufts and pencils, as well as lighter coloured warts; until the end of May on Dianthus and Lotus. Pupa black with reddish brown dorsal spots; cocoon under stones. The moth is on the wing in June and July, it has so far only been found in Corsica and does not seem to be common.

O. dubia *Tausch.* (19 c). ♂: Forewing bright yellow, with three dark brown transverse bands, the *dubia.* central one of which is forked anteriorly; the inner one of the two branches does not reach the costal margin, the outer one is strongly excurved. The proximal transverse band is elbowed beyond the centre and excurved in the centre; in the basal area a round dark spot. Hindwing dark brown with orange-yellow triangular transverse median area. In South Russia, Eastern Siberia, Armenia, Transcaspia, Kara-Kum, Tian-Shan, Tarbagatai district. — **judaea** *Stgr.* (19 c), in which the median area is broader and whitish yellow, occurs *judaea.* in Palestine, Egypt and Eastern Mauretania, while var. **splendida** *Ramb.*, distributed in Spain, Sicily and East- *splendida.* ern Mauretania, is distinguished by the brighter yellow colouring and larger size, the body of this form is also yellow, while in the main form it is dark brown with a yellow tip. The ♀ of var. *splendida* is figured as grey with a yellowish sheen and reddish dots. — In Asia Minor and Armenia occurs var. **turcica** *Led.*, which *turcica.* closely resembles *splendida*, but the black bands of the forewing are narrower and quite interrupted in places. — A form occurring in Syria and Mauretania in which the forewing is black with yellow spots, these being the remnants of the bands, is described as **josephina** *Aust.* (19 e). — Another form, **interrupta** *Gr.-Grsh.*, is *josephina.* lighter than true *dubia*, the black marginal band is very narrow, the sublimbal band is interrupted before the *interrupta.* discocellular spot, the latter merging together with the posterior half of the band; from Turkestan. — Fischer de Waldheim figures a form from Sarepta as **seleniaca**, which, if the figure is correct, strongly de- *seleniaca.* viates from the true *dubia*; it is considerably smaller, forewing with whitish ground, and with the proximal and submedian black bands merging together beyond the centre, so that only a horseshoe-shaped light ring open posteriorly and encircling the discocellular spot remains in the median area; in the basal area there are two black longitudinal spots. Hindwing yellowish white, with black marginal band, apparently without a broad black costal marginal band. — From Batna in Algeria (Province Constantine) I have before me about a dozen specimens from coll. Seitz, which the latter partly caught in June and partly bred. They belong to a form closely allied to *splendida* which I name **isolatella** *form. nov.* (19 e): the antemedian black transverse band *isolatella.* of the forewing is almost straight and not united with the submarginal band at the hindwing margin; the latter band is distinctly separate from the black discocellular spot, but almost entirely confluent with the marginal band, being separated from it by a yellow line, which is only distinct at both ends, being zigzag in the middle and interrupted in places. Expanse 22, length of forewing 12 mm. — ab. **umbripennis** *ab. nov.* (19 c) is another *umbripennis.* novelty which I have also from coll. Seitz. It is very like the form figured in Rambur's Cat. Syst. Lép. Andal. pl. II, fig. 4 c as a var. of *O. splendida*, but differs from it in that the antemedian transverse band is united with the sublimbal band by a longitudinal branch in the middle and at the hindmargin; between these two branches a circular spot of the yellow ground-colour remains. The limbal and sublimbal transverse lines are confluent, only at the costal and inner margins there is a short transverse narrow yellow streak, being the remains of a dividing band. Basal area of forewing mostly yellow. Basal half of hindwing dark yellow. Expanse 22, length of wing 10 mm. — In **transcaspica** *Krul.*, from Aschabad, the ground-colour of the forewing *transcaspica.* is almost as ochreous as on the hindwing and all the black markings are considerably broader than in the main form — **algirica** *Luc.* is a rather doubtful form from Algiers, whose forewing is black with a yellowish sheen and *algirica.* with a straight yellow submedian transverse band interrupted by the black veins, as well as a small yellow transverse spot at the discocellular. Hindwing yellow with dark median band and the indication of a dark median spot and basal smear. Expanse 22 mm. The „species" was placed by its author in the Arctiid genus *Trichosoma* (recte *Ocnogyna Led.*), but is certainly an *Orgyia*. ♀ unknown. According to Lucas an aberration of *algirica* occurs in which the yellow transverse band is reduced to a small yellow transverse spot; I name this ab. **obliterella** *ab. nov.* — Egg of *dubia* comparatively large, ivory. The larvae of all the forms differ *obliterella.* from the preceding species in that there are no long pencils of hair laterally behind the head and on segment 11, but short tufts, being still shorter than the dorsal brushes. According to Rambur the larva of *splendida* is black with tiny whitish and reddish yellow dots. That of the North African *isolatella* is sulphur-yellow with orange-red transverse spots on each segment and narrow black streaks below them. The dorsal tufts are bright wood-brown with a white centre, the short hump-like tail-tuft on segment 11 slightly yellowish brown, the outer hairs dark. Prolegs and anal clasper orange. A. Seitz often found the full-grown larva in June on very low bushes of Quercus ilex, more rarely also on different kinds of genista and other low-growing plants. Pupa in a whitish yellow cocoon; the ♀ not only does not leave the cocoon, but often the thin pupal skin which is like tissue paper does not come off but only splits in places, so that copulation can take place. The ♂ flies very wildly and fast by day in the sunshine, especially in the late afternoon. Its flight does not resemble that of any other *Orgyia* and is so rapid that it is impossible to follow the insect with the eyes. When attracted by the ♀-cocoons the ♂♂ can be obtained in large numbers, but are very timid even when approaching the ♀.

O. thyellina *Butl.* (♂ 22 b, ♀ 19 c), from the Main and North Islands of Japan, slightly resembles *tri- thyellina.* *gotephras*, but is much larger and darker; the forewing more pointed, in the basal third and at the inner margin brownish yellow with darker irroration as far as the large conspicuous white spot at the inner angle, the wings otherwise dark brown with black spots edged with a lighter colour, and a few small light smears. Hindwing deep dark chocolate, with two light fringe-lines. Expanse 33 mm. The ♀, which differs greatly from the ♂, occurs in a form with the wings fully developed and one with them half-developed, which are both figured on plate 19 e. The form with the wings fully developed is erroneously marked „♂", the ♂ of the species being figured on plate 22 e.

6. Genus: **Dasorgyia** *Stgr.*

It is questionable whether it belongs to this group; all the species are unknown to me in nature, and not a single fairly reliable description of the genus has as yet been published. It is said to be intermediate between *Orgyia* and *Dasychira*. In habitus and markings it most closely resembles *Dasychira*, also in the antennae, which however have not the pectinations nearly as long as in *D. selenitica* and the other known species of *Dasychira*, and in the hairs of the thorax, the shape of legs and abdomen. But the palpi are decidedly shorter than in *D. fascelina*, and the ♀♀ have shortened wings, short serrate antennae and thick woolly abdomen. Size considerably below the average of *Dasychira*. Abdomen short, slender, rather acutely pointed, without a conspicuous anal tuft. Known from Central Asia.

pumila. **D. pumila** *Stgr.* ♂: Forewing greyish brown, dusted with black, with an obsolescent central spot and two similar transverse lines at one-third and before the outer margin. Hindwing blackish, lighter at the base, with yellowish grey fringes. ♀ with shortened wings, which are similarly marked as in the ♂. ♂ 22 to 25 mm. Length of body of ♂ 23 mm. Tarbagatai district.

selenophora. **D. selenophora** *Stgr.* Wings brownish black. Forewing at the apex of the cell with large sharply defined blackish lunule which has a light edge; the outer half of the cell is dirty white and beyond it there is a light S-shaped transverse line. Towards the base there is also lighter scaling, which sometimes appears as a transverse line. Underside light, with black outer margin. Hindwing with light basal area dusted with black, in which there is a small central lunule, and broad black outer margin. Expanse 25 or 26 mm. Southern Ferghana. — GRUM-GRSHIMAILO figures a form from Pamir under the name *pumila* of *Stgr.* which probably is not specifically different from *selenophora*, but deviates from it in that the forewing bears three distinct whitish grey transverse bands; a small undulating submarginal band, a similar but simply curved one between the first and the middle of the wing and a much broader median band bounding the lunule on the inner side. The lu-
pamirica. nule of the hindwing bounded externally by a light transverse bar. I call this form var. **pamirica** *nom. nov.* (22 b).

alpherakii. **D. alpherakii** *Gr.-Grsh.* (22 b). Forewing yellow with blackish scaling in the marginal, costal and basal areas, and black discocellular spot. Hindwing with broad black marginal band. Below both wings lighter, the forewing with black discocellular spot. The bipectinate antennae brownish yellow. The body with yellow
grumi. and black hair. Length of wing of ♂ 12 mm. Kuku-Nor and Amdo districts. — **grumi** *Stgr.* has about the same size and colour as *selenophora*, but the antennae (as in the following form) bipectinate, the branches being twice as long; forewing blackish with two median spots and one beyond the cell yellowish white. Hindwing above uniformly black. The author of the form considers it probable that it is an aberration of *alpherakii*.
semenowi. Kuku-Nor (Tibet). — **semenowi** *Gr.-Grsh.* Certainly closely allied to *alpherakii*, occurring also in the Amdo-district. Forewing yellow, thickly dusted with black, the centre of the dark-edged median area and the outer half of the cell yellowish white, discocellular spot black. Hindwing yellowish black, darker at the outer margin. On the underside the wings are yellow, densely dusted with black towards the base. Forewing with the discocellular spot and marginal band black. Body with black hair variegated with yellow in places. Length of wing of ♂ 13 mm.

7. Genus: **Aroa** *Walk.*

Closely allied to *Orgyia*, but the palpi much longer and slenderer, the third segment porrect, legs less hairy, ♀ with fully developed wings, pectinations of antennae of the ♀ shorter than in the ♂. Fly in daytime. Usually small or medium-sized moths of rather uniform yellow or brown appearance. The genus is distributed in South Africa as well as in the Indian Region.

plana. **A. plana** *Walk.* (22 d). ♂ 28 to 34 mm., ground-colour mostly light ochreous but sometimes brownish, with a dark but rather obsolescent postmedian band on the forewing. ♀ ochreous, with dark dusting and a postmedian band on the forewing; a discocellular spot may be present or absent on both wings.

junctifera.

♀ 36 to 42 mm. In Kashmir, also distributed in Anterior India, extending to Ceylon. — In the form **junctifera** *Walk.* the wings are rather lighter towards the base, with black discocellular spot, which touches a brownish or reddish spot on the outside.

substrigosa. *pyrrhochroma.*

A. substrigosa *Walk.* (19 h). Light reddish yellow; forewing greyish in the marginal area at a subcostal and median stripe. Hindwing slightly lighter than the forewing. Pectinations of antennae black. Body beneath white. Fringes with indistinct darker spots. 32 mm. **pyrrhochroma** *Walk.* (19 i) is said to be a form of *substrigosa*, as they occur together and with all kinds of transitional forms. But true *pyrrhochroma* looks very different, the hindwing bearing a broad marginal band. North India, China.

cinnamomea. *aurantiaca.*

A. cinnamomea *Moore.* From the boundary of the Palearctic Region. Forewing light yellowish brown with rather indistinct discocellular spot and without transverse lines, fringes ochreous. Hindwing orange, suffused with brownish. ♂ 34 mm. — **aurantiaca** *Walk.* is a somewhat smaller form (30 mm.) which, to judge from the description, has darker dull brown forewings. North-West Himalayas.

flavicollis. *leucoides.*

A. flavicollis *Leech* (22 c), from Chang-yang in China, is semitransparent whitish; venation, costa, margin and fringes of both wings, as well as head and thorax smoky brownish grey. Collar yellow. Abdomen whitish with darker rings in the basal half. 40 mm. — Later LEECH has described (in Trans. Ent. Soc. London 1899, p. 120.) a ♀ from Chia-kou-ho which is said to be entirely whitish, with the thorax of the same colour as the collar. This form, which is more probably a separate species, may receive the name **leucoides** *Strand.*

8. Genus: **Cifuna** *Walk.*

Medium-sized, usually dark-coloured moths with long stout and usually obiquely porrect palpi, bipectinate antennae, and moderately long wings, whose outer margin is nearly straight. — Distributed in South and East Asia.

locuples. *confusa.*

C. locuples *Walk.* (19 d). Forewing dull reddish yellow or ochreous, variegated with whitish and purple, with curved indistinct transverse band and a more distinct, darker, and almost straight marginal band russet brown. Hindwing brownish yellow to ochreous. Both wings beneath reddish yellow, bearing a blackish spot externally light-edged, and a similar submarginal band. Forewing usually with distinct reniform discocellular spot. ♀ darker and more unicolourous. Expanse 40 to 52 mm. The chief form occurs in India as well as in South and Central China. — In Amurland, Corea Japan, etc., the species occurs in a smaller (32 to 35 mm.) and darker form, var. **confusa** *Brem.*, in which there are often sharply defined black spots before the inner angle and in the costal half of the basal area, these spots being at most indicated in true *locuples*. Moreover, at least in Japanese specimens, the median band of the forewing is more irregular than in true *locuples*. — Larva not unlike that of *fascelina*, with long-hairy brushes; those near the head yellow with dark hairs in the centre; on low-growing plants, especially on vetches (GRAESER).

eurydice.

C. eurydice *Butl.* (= amata *Stgr.*) (19 d). ♀: Forewing olive-grey, in the basal half with a broad black transverse band not reaching the base; a discocellular spot is at least indicated; at the costal margin in the apical half there is a deep black narrow halfring and in the marginal area a transverse row of black dots, which markings are larger on the grey-blackish underside. Hindwing black (brown), with olivaceous greyish yellow outer margin above and below. ♂ smaller and darker, hindwing uniformly brownish black to the olive-grey fringes. ♂ 39, ♀ 46 mm. — Larva very brightly coloured, with rose-red dorsal tufts. Full-grown in June, on Vitis amurensis. Amurland, Japan.

jankowskii.

C. jankowskii *Oberth.* (19 d). ♂: Reddish brown, forewing in the basal half with two or three narrow whitish transverse streaks edged with black on the inner side, discocellular spot indistinct and reniform; in the apical half two black zigzag or wavy transverse lines, between them a black transverse stripe twice or three times interrupted. Hindwing without transverse markings, but with two or three short black longitudinal streaks in the apical half; similar streaks on the underside of both wings, but only in the basal half; a submarginal dark transverse band is indicated beneath on both wings. ♀ slightly lighter, especially the hindwing, which is traversed by a broad blackish transverse line. ♂ 33, ♀ 30 mm. — Larva resembling that of the preceding species, but the dorsal tufts of hair golden brown; on Vitis amurensis. Eastern Asia.

9. Genus: **Laelia** *Steph.*

Medium-sized moths, unicolourous, white, ochreous, brown, etc., or with very simple markings. Closely allied to *Aroa*, but nocturnal, the wings rather more elongate and the membrane of the wings forming a small groove at the upper angle of the cell on the underside. Antennae long, with long pectinations in the ♂, and short ones in the ♀. Palpi long and porrect. Veins 6 and 7 of the hindwing stalked. Hindtibiae with middle and apical spurs. Larva as far as known with yellow dorsal brushes and dark pencils on the first segment, on species of grass and bamboo; moths in the summer; the ♂♂ fly about briskly, the ♀♀ resting on stalks of grass or bamboo-leaves near the ground.

coenosa. candida. sangaica. paucipuncta. sinensis. gigantea.

L. coenosa *Hbn.* (19 i). ♂: Pale ochreous, with three obsolescent longitudinal smears and a few blackish dots in the marginal area of the forewing. ♀ uniformly dirty white. Widely distributed in Central Europe (North Germany, Northern France, England, Hungary, Bukovina, Bulgaria, Catalonia) and also occurs in Eastern Asia (North China, Ussuri district, Amur, Corea, Japan). A form from Central China, white or almost imperceptibly yellow in the ♂ sex, at most with indications of dark marginal spots, is described as **candida** *Leech*; this is also recorded from the Bukovina, and the ♀ of it described as pure white. — **sangaica** *Moore*, from Japan and China, is closely allied to *coenosa*, and probably the two have often been confounded. *sangaica* is greyish ochreous on the entire upperside, being only slightly whitish at the base of the hindwing (in *coenosa* the hindwing is unicolourous and lighter than the forewing); the number of black spots six at most, base of thorax and abdomen whitish; underside of body lighter than the upperside and without spots; frons and legs brownish ochreous. 31 to 32 mm. Typical locality: Shanghai. Dr. A. Seitz, on 11. 8. 1891, caught a ♂ near Yokohama which is a new form, ab. **paucipuncta** *form. nov.* (19 i): forewing with at most four black dots, forming a slightly oblique but almost straight line. Length of forewing 18 mm, of body 16 mm. — **sinensis** *Walk.* (= brevicornis *Walk.*). ♂: Head and thorax dirty white. Abdomen yellowish, with white woolly hairs anteriorly. Wings greyish at the costa, otherwise fairly pure white, with single obsolescent black dots in the marginal area. Forewing below suffused with reddish brown at the margins. Hindwing white. Basal segment of palpi, underside of antennae and femora brownish. Body of ♀ larger than in *coenosa Hbn.*, wings pure white without markings, but with a diffuse spot in cell 2. Below suffused with lighter brownish at the margins. Antennae seen from above white, from below black. Length of forewing 17 to 18 mm. Typical locality: Hongkong, also recorded from Corea and said to occur at the Middle Amur. — **gigantea** *Butl.* in the ♂ closely resembles true *coenosa*, but is considerably larger, without smoke-coloured suffusion or striation, and has an irregular angulate row of six black spots transversely across the wings. Hindwing white. Thorax cream-colour. Frons ochreous. Legs white instead of yellow and grey. Abdomen and underside white. Expanse 52 mm. Yokohama. — Like *sangaica*, also *sinensis* and *gigantea* have been regarded as separate species, but I leave the question open, as the material before me does not suffice to determine whether they are distinct species or only local races. — Egg smooth, white, with a brown incomplete ring. The larva of *coenosa* lives on various species of grasses on damp meadows, is yellowish grey with black, white and reddish yellow markings, yellow dorsal tufts and black pencils; until July on Festuca, Carex and other grasses. Pupa with tufts of yellow hair, in a yellow cocoon intermixed with hair. Moth in July and August.

umbrina.

L. umbrina *Moore* (20 a), from North India, is in the ♂ wine-brown, on the forewing with an angulate transverse row of small light spots bearing light pupils; hindwing in the basal two-thirds more thinly scaled and therefore appearing lighter, more greyish: otherwise smoky brown. Thorax reddish brown, abdomen smoke-brown. Underside smoky brown, with lighter margin and veins. Legs partly ochreous. 34 mm. In the Himalayas, from Kulu in Kashmir.

japonibia.

L. japonibia *spec. nov.* (19 i ♂, 21 c ♀). ♂: Forewing and hindwing uniformly brown-grey, the former with a black dot on the discocellular, which is 1. 5 mm long and half as broad. Fringes, as far as recognisable, like the wings. Hindwing with the indication of an almost linear bar on the discocellular; beneath this bar is distinct, being slightly widened at both ends, while the discocellular spot of the forewing is only indicated below and is very distinct above. Body like the wings, slightly lighter below. Legs grey, suffused with brownish yellowish. Antennae greyish white with darker pectinations. Expanse 37 mm, length of body 14, length of forewing 17 to 18. Japan (Coll. Seitz).

exclamationis. disjuncta.

L. exclamationis *Koll.* (= rubida *Walk.*, cervina *Walk.*, rotundata *Walk.*) (19 i). ♂: Reddish brown or dark fawn; forewing with irregular black irrorations and a black line as discocellular spot, which often continues as far as vein 2 and is interrupted by lighter veins. ♀ lighter and paler. ♂ 36, ♀ 44 mm. In ab. **disjuncta** *Walk.* (= rotunda *Moore*, Lep. Ceyl. II, pl. 110, fig. 4, 4a) the discocellular spot is separated into two spots and the colouring is more greyish. — Larva brown, with dorsal tufts of the same colour and a subdorsal row of very short orange-coloured tufts. Kashmir, also through Anterior India to Ceylon.

testacea. juvenis. colon.

L. testacea *Walk.* (♀ = uniformis *Hamps.*) (20 a). Like *exclamationis*, but the forewing with a black subapical streak (♂). ♀ more ochreous instead of red. The true *testacea* is very light, in the ♀ with scarcely a vestige of black dusting. — In the form **juvenis** *Walk.* the forewing of the ♂ is said to be longer. — **colon** *Hamps.* has a dot-like (♂) or quite short (♀) discocellular spot. — A preeminently North Indian species, probably extending into Palearctic territory in the North-West.

L. litura *Walk.* ♂: Like *exclamationis*, but dark greyish brown, head, collar and legs ochreous. *litura.* 30 to 36 mm. — Distribution as in the preceding (Kashmir, etc.).

L. heterogyna *Hamps.* (22 c), from Kashmir, differs from the preceding species principally in that *heterogyna.* the ♀ has aborted wings. ♂ dull brown, clothed with long hair-like scales, discocellular spot of the forewing smoky black, a smoke-coloured smear between the base of veins 2 and 4 and an indistinct smear at the upper angle of the cell. ♂ 44 mm.

10. Genus: **Arctornis** *Germ.*

On account of the reasons mentioned in the introduction we place this genus with the *Areolatae* despite the fact that it has no areole*); but I do not doubt that specimens of *A. l-nigrum* sometimes occur which have an areole. Otherwise *Arctornis* is closely allied to *Laelia* and *Stilpnotia*. Antennae comparatively shorter the in *L. coenosa*. Most easily distinguished from *Stilpnotia* by the two dorsal veins of the forewing being connected by a transverse vein as in the Noctuids. — Larva (of *A. l-nigrum*) very hairy; than hairs are especially long at both ends and arranged in tufts dorsally; it pupates between leaves spun together, and the moth emerges after two or three weeks, sometimes even after a few days (8 to 10). The moths are extremely delicate; they rest with the wings flat in roof-shape on the surface of a leaf, almost exactly forming an equilateral triangle. They are then very difficult to recognise, as their colour differs little from that of the leaf, the wing in life having a layer of greenish liquid matter between the membranes. When the moth dries the greenish hue disappears, as was already observed by Ochsenheimer, the wings assuming a more or less pure white colour.

A. l-nigrum *Müll.* (20 a). Pure white, with narrow black costal margin and black discoidal vein. *l-nigrum.* Legs with one to three black spots. 45 to 60 mm. Widely distributed in Europe (South Sweden, Finland, Denmark, Central Europa, North and Central Italy, Armenia, Amurland, Japan, Corea). Larva with eight tufts of hair dorsally, of which the three central ones are reddish yellow, the others whitish. It hibernates and lives until June on deciduous trees, especially young limes and beeches, from which it jumps down when disturbed. The moth, which appears after a very short period of pupation, is almost everywhere rare in Europe, more common in Asia. Pupa transparent light green, with yellow and black marking. After hailstorms and heavy rains, which destroy many moths, one often finds the moths thrown down on the roads in woods.

A. alba *Brem.* (= sinensis *Moore*) (22 c). Pure white, wings with a silky gloss, forewing with a *alba.* black discocellular spot, which is sometimes absent (= ab. **depuncta** *ab. nov.*). Frons, palpi and parts of the *depuncta.* legs ochreous. Pectinations of antennae brown. 34 mm. — In Bremer's description an ochreous spot is mentioned in the middle of the wing, but as such a spot seems never to occur (also according to observations by Leech, 1899), and as Bremer does not mention the black discocellular spot, I take it that the description „ochreous" is a laps. cal. for „black" spot.

11. Genus: **Stilpnotia** *Westw. & Humphr.*

Closely allied to the preceding genus, but the dorsal veins of the forewing not connected, veins 6 and 7 of the hindwing with longer stalk, 1a considerably shorter than 1b. Palpi erect, reaching the vertex of the head. Antennae bipectinate in the ♂, bidentate in the ♀. Hindtibia with two pairs of spurs. Without or with an areole. Larva of the Palearctic species hibernating. The moths of some species may be very abundant in certain years and congregate in migrating swarms.

S. salicis *L.* (20 a). White, sometimes with ochreous, or in the ♂ even blackish costal margin; *salicis.* head and collar as well as the pectinations of the antennae dark. Tibiae and tarsi with broad black rings. 44 to 55 mm. Throughout Europe, southward to South Russia, the Northern Balkan Peninsula, throughout Italy, Central Spain, Corsica, Armenia, North-Eastern Asia Minor, Issyk-kul, Altai, Tian-shan, South-Eastern Siberia; also in the Arctic region, for instance South Varanger in Finmark (Norway). — The East-Asiatic form **candida** *Stgr.* has much purer glossy white and entirely opaque, more thickly scaled, *candida.* wings and is on the whole smaller, with narrower wings. From Eastern Siberia, Urga, Amurland, Japan, Corea, China. — Yellowish grey specimens are ab. **sohesti** *Capr.* Specimens from Tian-shan with black *sohesti.* pectinations of the antennae of the ♂ are **nigripennata** *Stgr.* ab. **nigrociliata** *Fuchs* has sharp black *nigripennata.* marginal third of the costal margin and glossy black fringes; Germany. ab. **rubicunda** *Strand* has both the wings and hairy covering reddish, almost rose-red at the costal and inner margins of the forewing *nigrociliata. rubicunda.* (♂); in South Norway. — The eggs are laid on tree-trunks in clusters covered with a paper-like substance.

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*) In Aurivillius, Nordens Fjärilar, *Laria* (= *Arctornis*) is described as having an areole.

In July. Larva black with a row of light dorsal spot and yellow lateral line. Segments 4 and 5 each with a pair of united fleshy pointed tubercles. It lives on species of willow and poplar, hibernates, is often noxious and pupates in a loose cocoon between leaves, the pupa being glossy black with white spots and yellow tufts or hair. The moth appears in July and August. The ♂♂ already begin to fly before dusk in the evening and often swarm like snow-flakes round the poplars and willows at country-roads.

flavosulphurea. *cretacea.* **S. flavosulphurea** *Ersch.* Closely allied to *salicis*, but forewing and thorax sulphur-yellow, the hindwing and abdomen lighter. Pectinations of antennae light. ♂ 35 mm. Ferghana, Sarafshan district, and perhaps near Angora. — The ♂ of **cretacea** *Stgr.* (22 d) is chalky white or greyish white, ♀ whitish. From Issyk-kul.

ochropoda. **S. ochropoda** *Eversm.* (22 d). White, with the forelegs, tarsi of hindlegs and palpi ochreous, the pectinations of the antennae being black. Forewing of ♀ with very slight sulphur-yellow suffusion. From South-Estern Siberia and the Ussuri district.

sartus. **S. sartus** *Ersch.* (21 d). Wings uniformly greyish brown, body above slightly ligher. Antennae greyish yellow. ♂ 33, ♀ 35 mm. Sarafshan district, Ferghana, Issyk-kul, Tian-shan.

cygna. **S. cygna** *Moore* (= cymbicornis *Butl.*) (20 b). ♂ pure white, wings in life with a bright light green sheen and semitransparent, veins yellowish. Antenna boat-shaped, very long and with light brownish yellow pectinations. Tips of palpi yellowish. Tibiae and tarsi of the fore and middle legs with black spots on the outerside. 48 mm. East Asia.

moorei. **S. moorei** *Leech*, from China, is almost like *cygna*, but the wings are shorter and the margin is more rounded; the shaft of the antenna black with the exception of the base. ♀ pure white, wings with glossy silvery white scales, which form numerous slightly raised transverse bands; forewing with small black discocellular spot. Wings broader than in *Arctornis alba Brem.* 28 to 29 mm.

12. Genus: **Ivela** *Swinh.*

So closely allied to *Stilpnotia* that the only species would perhaps be better placed in that genus. The palpi are shorter than in typical *Stilpnotia* as conceived by Hampson, but scarcely shorter than in *S. salicis*, porrect. In facies less robust, abdomen cylindrical and not extending beyond the anal angle, costal margin of forewing convex, and the apex of the forewing more rounded than for instance in *S. salicis*, margin convex, almost not oblique and in this very distinctly differing from *salicis*, hindmargin also rounded. I do not find any other noticeable difference in the venation except that in the forewing the stalk of veins 7 and 8 is considerably longer and also that of 8 and 9, vein 9 being therefore very short (about as in *S. comma Hutt.*, cf. Hampson, Fauna of Brit. India, I p. 487). It is not correct that vein 10 originates at one-third before the end of the cell, as Swinhoe states; its position is as in *salicis*. Areole absent. Hindwing broader and more obtusely rounded than in *salicis*.

auripes. **I. auripes** *Butl.* (20 b). ♂ greyish white, forewing with silvery scales, especially on the veins, dusted with greyish brown and very slightly suffused with dark grey along the costal margin (most distinctly below), and also along the veins; antennae longer than in *Arctornis l-nigrum*, with a black spot near the base, and with black pectinations. Fringes almost imperceptibly darker than the wings and glossy. Discocellular spot absent. Forelegs golden-yellow, the others with yellowish tarsi. 50 to 63 mm. ♀ larger, costal margin, veins and fringes scarcely darker, femora white below. Expanse 55 to 70 mm. Japan. I have only compared specimens from Corea; they correspond to the smaller dimensions given.

13. Genus: **Caragola** *Moore.*

A genus consisting of few, mostly Indo-Malayan, medium-sized, white moths with small porrect palpi; hindtibia with only one pair of spurs, and antennae bipectinate. In the forewing vein 3 originates rather far before the apex of the cell, and 5 from the apex, 6 from the anterior angle, 7, 8 and 9 stalked, 10 from the anterior margin of the cell without forming an areole (always?).

sericea. **C. sericea** *Moore.* ♀ pure silvery white. Palpi and inner side of forelegs black. Forewing without bands of raised scales. 38 mm. Kashmir, Sikkim, Masuri, Tibet.

14. Genus: **Pantana** *Walk.*

This genus consists of a few exclusively South and East Asiatic moths of medium size, which are usually uniformly coloured and marked, of comparatively slender build, with large wings, the hindwings appearing broad and truncate, extending far beyond the abdomen. Palpi rather slender and naked, obliquely porrect and upturned. In some points the genus resembles *Orgyia*, but, apart from the palpi already described, differs from this genus in that the legs are less hairy and that the ♀♀ have fully developed wings as well as bipectinate antennae, the pectinations being short. The ♂♂ begin to fly already after 5 o'clock in the evening sunshine, describing circles and loops in the air, their restless and tumbling flight resembling that of *Orgyia*. They like to fly along the bamboo-fences with which the gardens and court-yards are often surrounded in East Asia. Nets with long poles must be used for catching them, as the moths fly up into the air when pursued.

P. visum Hbn. (= dispar *Walk.*). In the ♂ the head is orange-yellow, thorax light brown, abdomen whitish. Forewing yellowish white, variegated with light red and brown in the costal half, excepting however the middle of the costa and the discocellular; two dark smears below the angle of the cell. Hindwing pure white. Costal half of underside of forewing orange, but black towards the apex. 44 mm. — var. **ampla** *Walk.* (20 b). A ♂ from South China, June 1891, gives rise to the following remarks. *ampla.* According to the locality this specimen should be *P. ampla Walk.* I have not, however, been able to discover from the descriptions a specific difference between the two species (*visum* and *ampla*), and I cannot consider the specimens from India before me as specifically different from those from China. Only two Chinese specimens well enough preserved are before me. Walker and after him Hampson give the presence of one or two dark smears on the middle of the forewing as a characteristic of *visum*. But such smears are not distinctly present on either of the specimens before me, nor in Huebner's figure, while there is a slight indication of them also in the Chineses specimen. According to Walker *visum* is slightly larger than *ampla*, but Chinese examples (expanse 37, length of forewing 21 mm.) are quite as large as the Indian ones before me. Huebner's figure is moreover so bad that the insect cannot with certainty be recognised from it. Another difference is that the dark subapical spot on the underside of the forewing is black in the Chinese specimen and nearly reaches the margin, while in most Indian examples it is more brown-black and slightly removed from the margin, but this does not seem to have any significance. Walker had already drawn attention to the two forms being probably varieties of one and the same species. The form *visum* inhabits Burma.

P. sinica *Moore.* ♂ greyish white; forewing at the base, costal and distal margins smoky brownish. *sinica.* A black chequered irregular spot between the veins below the cell. Thorax smoke-brown; the frons and palpi ochreous. Abdomen and legs greyish white. Pectinations of antennae dark brown, shaft grey. 32 mm. In East and Central China. — Leech (1899) described a ♂ from Chang-yang, but did not name it, in which the hindwing is pure white with a broad marginal band extending from the costa almost to the anal angle: ab. **limbifera** *nom. nov.* *limbifera.*

P. bicolor *Walk.* (= delineata *Walk.*, circumdata *Walk.*, sordida *Walk.*, comparata *Walk.*) (20 b), *bicolor.* distributed over the greater part of continental India, also its north, has the head, collar, palpi and last segments of abdomen orange, while the basal segments are white. Wings yellowish white, forewing slightly suffused with a darker colour between the veins, the hindwing with dark marginal band interrupted by the veins. Below, the greater part of the forewing and a discal smear on the hindwing are dark. ♀ with scarcely a trace of darker colour.

P. nigrolimbata *Leech*, from West China, has orange-yellow head and palpi, dark thorax and abdomen. *nigrolimbata.* Forewing white, with black band, which is widest anteriorly and interrupted below vein 2; a black spot at the hind angle of the cell and two similar but larger spots beyond the cell. Hindwing white, with black marginal band from the costa to vein 3. ♀: Forewing ochreous white, with black spots as in the ♂, but without marginal band. Hindwing dirty white, without markings. 48 to 54 mm.

P. simplex *Leech*, likewise from West China, has light blackish brown forewing with the venation *simplex.* lighter in parts; costa with light brown transverse streaks to the apex of the cell. Discocellular spot lunular and light brown. Costa and fringes darker. Hindwing white. Head and thorax like the forewing. Palpi golden brown. Abdomen lighter. ♂ 34 to 40 mm.

P. pluto *Leech* has black-brown wings, forewing slightly lighter at the apex of the cell, underside *pluto.* a little lighter than upper. Legs, thorax and abdomen dirty yellowish white; head and palpi light orange. ♂ 36 mm. Typical locality: I-chang in China.

P. eurygania *Druce*, from Southern Central Ching (Chang-yang, Sze-chuen). ♂: Head, antennae, *eurygania.* thorax, tegulae, legs and abdomen black. Forewing black, with a white spot at the apex of the cell and a larger white spot below the cell reaching to the inner margin. Hindwing white, black at the base, margin with a broad black band from the apex almost to the anal angle. ♂ 32 mm.

15. Genus: **Pida** *Walk.*

Facies and venation about as in *Dasychira*. Palpi upturned and extending beyond the vertex. Pectinations of antenna of ♂ long, of ♀ short. Legs with thick long hair. Only three species, of which only one concerns us.

strigipennis. **P. strigipennis** *Moore* (20 c). Forewing yellowish white, striated with black, there being least striae in the postmedian costal area. Discocellular spot black. Hindwing orange-yellow, striated with black at the apex. Head and thorax dark reddish brown. Abdomen orange-yellow. Metathorax with black tuft of hair. Antennae black with whitish sides of the shaft. ♂ 46, ♀ 55 mm. — From Chang-yang; also widely distributed in India.

16. Genus: **Numenes** *Walk.*

Larger, conspicuously marked moths; forewing subtriangular, sharply angulate at the apex, with convex costal margin and almost straight distal margin. Hindwing extending considerably beyond the abdomen. Palpi obliquely upturned; antennae of both sexes with long pectinations. Venation as in *Dasychira*, veins 6 and 7 of hindwing from the cell. An Indian genus with about 6 species.

disparilis. **N. disparilis** *Stgr.* (20 c). ♂: Forewing black, with olive sheen and a straight yellowish white oblique band extending from the middle of the costal margin to the anal angle and enclosing a dark spot at its posterior end; the veins light. Hindwing with a broad white transverse band extending from the middle of the inner margin to the apex of the inner margin, but without reaching the latter. Beneath, the white markings are slightly broader, but the veins of the forewing remain black. Forewing of ♀ proximally with four light transverse bands, the distal ones of which unite just before the anal angle, while the proximal one is only half as broad as the others. Hindwing and abdomen light orange-yellow, the former with a large transverse black submarginal spot constricted in the middle. Below, both wings of the ♀ are yellow with two black spots on each. ♂ 43 to 46, ♀ 51 to 60 mm. Amurland, Japan, Central *separata.* and Western China, usually not common. — **separata** *Leech* is distinguished in the ♂ from true *disparilis* in the yellowish white transverse band being united with the apex of the wing by a band: there is also a white spot near the base of the costa. Hindwing without the white central spot. In the ♀ the basal band of the forewing is broader and the hindwing bears two black spots instead of a stripe. Both sexes larger than the main form. ♂ 58, ♀ 82 mm. Chang-yang in China. A ♀ form of *separata* is distinguished by the basal band of the forewing being interrupted in the middle and by the very indistinct dis- *biseparata.* cocellular spot on the underside of the hindwing; from Shiobara in Japan (Coll. Seitz): ab. **biseparata** *nov. ab.* (22 f). — Leech has described a ♂ from Ohoyama in Japan under the name of *Lymantria albofascia*, which he afterwards himself declared to be a form of *disparilis*, but which is very probably a separate species. It is larger (56 mm), the veins of the forewing not lighter than the ground-colour, the light band of the forewing quite white, with parallel sides, broader than in *disparilis* and not enclosing a dark spot *albofascia.* posteriorly; hindwing uniformly white. At present this **albofascia** (20 c, 22 e) may remain with *disparilis* united as a variety. — The larva lives on beeches, has two brush-like black tufts of hair on segments 4 and 5, as well as large warts with white hairs, and a bladder-like swelling above on segment 10.

17. Genus: **Himala** *Moore.*

Only one species belongs to this genus. It closely resembles the Notodontid *Gazalina* and is often placed near the latter, while *Gazalina* was hitherto placed with the *Lymantriidae*. Palpi slender and porrect. Antennae with long pectinations and hairy basal segment. Areole absent.

argentea. **H. argentea** *Walk.* (21 d). Head, thorax and abdomen white, forewing silvery white, with black veins and dark margin. Hindwing white, veins black in the apical half of the wing, marginal line black. ♂ 44, ♀ 54 mm. India, also in the North-Western Himalayas.

2. Group: **Inareolatae.**

At the head of this group stands the large genus:

18. Genus: **Lymantria** *Hbn.*

Medium-sized or large moths which are throughout light in the ♀ sex and often very bright in colour, being remarkable for their sexual dimorphism and containing our most noxious insects. Wings of ♀ sometimes aborted, but on the whole normally developed. Antennae of ♂ with long pectinations, in the ♀ with shorter ones or dentate; hindtibiae as an exception with only one pair of spurs. Wings of ♀ more elongate than those of the ♂. Palpi very hairy. Vein 6 of the forewing originating below the anterior angle of the cell, 7, 8, 9 and 10 stalked, 7 branching off at a greater distance from the cell than 10. Veins 6 and 7 of the hindwing originating from the anterior angle of the cell. — Distributed in the Palearctic, Indo-Australian, African, and Nearctic Regions. Closely allied to the genus *Cispia**).

dispar. **L. dispar** *L.* (20 d). Forewing with four distinctly separated black transverse lines and one or two black basal spots, in the ♂ brownish grey, at the base and in the outer median area purer grey; hindwing of ♂ yellowish brown with indistinct dark discocellular spot and indistinct transverse band. Wings of ♀ yellowish white, forewing with black discal spot, hindwing with or without dark submarginal band. ♂ 36 to 50, ♀ 50 to 65 mm. Distributed throughout the Palearctic Region with the exception of the Canaries, the Arctic and partly the Subarctic districts, very rare in South Scandinavia and Finland, in the East in Amurland, Corea, Japan, North, West and Central China. Also in North America. — The species varies very strongly and many forms have already received names. *disparina.* In the ♂ of **disparina** *Müll.* the ground-colour is predominantly whitish yellow, especially in the marginal cells; the ♀ is also lighter and without any marking except three regular, connected, wavy or almost zigzag, dark, transverse lines, as well as dark marginal dots on both wings. *fasciata.* ab. **fasciata** Rebel, ♀, which is said to bear "transverse stripes widened into bands on the forewing", is probably disinguished from *disparina* by the dark transverse markings being broader and the ground-colour perhaps darker than in *disparina*. *bordigalensis.* ab. **bordigalensis** *Mab.* (= disparoides *Gasch.*) is a dwarf form (♀ expanse about 40 mm., the ♂ proportionately smaller) (from France), while *major.* **major** *Fuchs* is the name given to a large form (length of forewing of ♀ 34 to 35 mm., ♂ 23 mm.) from North Germany. *erebus.* **erebus** *Th.-Mieg*, from North England, North-West Germany, North China, etc., is a much darker, predominantly black-brown ♂-form. *semiobscura.* The transition to it is **semiobscura** *Th.-Mieg.* — *umbrosa.* **umbrosa** *Butl.*, from Japan, is distinguished by diffuse markings and the absence of the black wavy dentate discal line outside the cell of the forewing, while the sublimbal dark transverse line is present but very indistinct; ♂ up to 51 mm., ♀ about 62 mm. — *wladiwostockensis.* **wladiwostockensis** *ab. nov.* (20 c) ♂, is smaller (expanse 31, length of forewing 15. 5, of body 13 mm.); forewing blackish brown, with indistinct greyish markings, median and marginal areas about equally dark, the dark dot-like spots of the basal half sharply defined; hindwing smoky brown, slightly darker at the margin. Ground-colour of underside of both wings like the hindwing above, with discocellular spot and transverse band as in the principal form. Vladivostock (Coll. SEITZ). — SCHULTZ describes several aberrations with reduced markings from German specimens. *insignata.* **insignata** ♀ is unicolourous, being even without the discocellular spot and without the black dots before it on the forewing. *angulifera.* **angulifera** ♀, without any marking on the forewing but the discocellular spot and one black dot, while the hindwing is normal. *unifascia.* **unifascia** ♀, with a dark transverse band in the median area of the forewing, but otherwise without markings. *submarginalis.* **submarginalis** ♀, with a broad dark band along the margin of the hindwing. — *japonica.* **japonica** *Motsch.* (= hadina *Butl.*, fumida *Butl.* ♂ nec ♀) (20 d) is the Japanese form, which is distinguished by the larger size and the absence or indistinctness of the black markings at the costal margin and on the wing-surface, apart from the discocellular spot. Moreover, the ground-colour of both wings is darker, being greyish brown, and the black marginal spots, especially on the hindwing, are more distinct. The largest specimens before me measure 92 mm; according to LEECH (1899) East Asiatic specimens of "*Lymantria dispar*", with which the unites the form *japonica*, reach 114 mm., the latter dimensions probably apply to *japonica*. The ♂, according to MOTSCHOULSKY, is distinguished by the indistinctness of the brown wavy lines as well as by the larger size. It is also considerably darker, being dark smoky brown; the hindwing quite unicolourous, the forewing, which has a tinge of olive, bears two incurved, widely separated, black zigzag lines, which bound the central third of the wing and enclose a broad irregular obsolescent band of the same colour; the margin with a broad blackish band irregularly sinuate on the inner side; fringes chequered with brown and black. ♂ 53 mm. Japan, Kwei-chow in China. — Another Japanese form is *fumida.* **fumida** *Butl.*, closely allied to *japonica Motsch.*, but smaller and darker. ♀, forewing smoky brown, lighter in the marginal area with the exception of the apex, the discal lines composed of lunules closer together than in *L. dispar*; the inner one (originating at the apex of the cell) fairly distinct, the second one indistinct, the third consisting of broad lunular smoky brown spots. Hindwing dirty greyish yellow, with a broad submarginal light brown band, but entirely without marginal spots. Abdomen like the hindwing, but the last segments with broad red margins. ♀ 63 to 65 mm. ♂ like the ♀, but considerably smaller and darker. — *sinica.* **sinica** *Moore*, ♂ from Shanghai and Formosa, is perhaps not different from *fumida*, but according to the description it appears that the abdomen is everywhere suffused with reddish; collar red, discocellular spot present on the underside of both wings; it is not certain from the description

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*) Hampson's characterisation of the two genera *Lymantria* and *Cispia* in "Moths of India" is partly incorrect. In the key *Lymantria* stands under "palpi upturned", while in reality they are porrect. In the diagnosis of *Cispia* „palpi porrect" is stated, which is correct, but in the accompanying figure the palpi are drawn as upturned; they are also relatively longer and slenderer than in this figure, *Cispia* being fairly easily distinguished thereby from the otherwise very closely allied *Lymantria*. Then, in the diagnosis of *Cispia* there stands: "10 being given off from nearer the cell or from the same point as 7", but in the figure it certainly originates nearer the aper than 7. In nature only *Cispia venosa* Walk. is known to me, and in this species 7 and 10 originate from about the same point or 10 perhaps a shade nearer the apex.

that only the forewing has dark marginal spots. ♂ 38. 3 mm. — The eggs are laid in brown clusters densely covered with anal wool, on trunks, branches, boards, stones, etc., so that they look like ochreous clumps of fungus and have gained for the moth the German name of "Schwammspinner". The eggs hibernate under this protective covering, and the small larva emerges in April. The larva grows until July, and is then grey marbled with yellow; dorsal warts blue on the first 5 segments, red on the others; head greyish yellow with two brown streaks; lives on fruit-trees and various other deciduous trees. Pupa blackish brown, with reddish brown hair arranged in tufts. The hairs of the larva sting slightly when touched roughly, but do not cause any inflammation on a not too tender skin. In years when the larvae are unusually abundant, they are much decimated by a beetle, Calosoma sycophanta, which the caterpillar tries to evade by letting itself suddenly down from the branches by a thread, remaining hanging about 1 or 2 yards above the ground. The pupa, which lies in a very loose cocoon, usually between leaves, is as such pursued by an ichneumonid (Pimpla); it is also often infested by Tachinae; otherwise the moth emerges from the end of June to September. The ♂♂ are on the wing in daytime in the sunshine, their flight being restless; the ♀♀, whose wings are often crippled, are very sluggish and mostly do not fly at all. — By crossing geographical races Brake has obtained whole series of gyandromorphous specimens (cf. Plate 22g). By continuous inbreeding the size of the form *japonica* was in Germany in a few generations reduced to that of the West European *dispar*. We also mention that it is said to be proved by separating the ♂♂ pupae from the ♀♀ pupae that parthenogenesis obtains, this phenomenon being observed in nine succeeding generations. Much doubt is thrown on these results by various authors.

mathura. **L. mathura** *Moore* (20e). ♀: Head and thorax white, two white spots each on collar, meso-and metathorax; palpi, teeths of antennae and two spots on the mesothorax red. Abdomen red, with a row of black spots above, endsegment whitish; legs black and red. Forewing white, with red and black basal spots, dark transverse bands partly separated into spots or lunules, and black rounded marginal spots; costal margin and fringes red. Hindwing red, with dark discocellular spot, a sublimbal row of dark spots and small round marginal spots. ♀ 96 to 112 mm. ♂: Forewing with whitish ground and black-brown markings, those in the marginal area being very sharply defined; in the middle of the cell a small round dark spot in a whitish patch. Hindwing and abdomen light orange; the former with sharply defined black discocellular spot, an also black sublimbal row of almost connected spots and smaller, distinctly separate, marginal spots. Abdomen with a longitudinal row *aurora.* of black dorsal spots. Kashmir, Japan, and widely distributed in India. — The very closely allied form **aurora** *Butl.* (20e) is smaller in the ♀; forewing with the ground-colour darker and the transverse dark bands more numerous, without red spot on the mesothorax, also without black dorsal ones on the abdomen. ♀ 75 to 80 mm. ♂ fairly uniformly black-brown, without distinct markings (according to Swinhoe the ♂ type described by *fusca.* Butler was an old faded specimen). Amurland, China, Corea and Japan. — Under the name of **fusca** (20e) Leech figures of this species the ♂-form which he considers the darkest, but which, apart from the sharply defined black transverse bands of the forewing, seems to agree with the form which Swinhoe (1903) considers the chief form. In the basal half three narrow black transverse bands, the proximal one of which stands immediately at the base, while the other two are less distant from each other than from the proximal one. Further, there is a transverse band through the centre and a zigzag dentate submarginal band, as well as black marginal spots. Hindwing uniformly black-brown. Nagahama, in July.

monacha. **L. monacha** *L.* (20g). This moth, only too well known unfortunately on account oft its bad repute, has the name of "Black Arches". It has white forewing with black basal spots and four sharply angulate black transverse lines, the second of which is the broadest; hindwing greyish white and grey. Abdomen light rose-pink. 37 to 55 mm. Distributed nearly throughout Europe with the exception of the Arctic Region, known from Castile, North Italy, Croatia, Greece, also from Armenia, Amurland and Japan. — The species varies *nigra.* strongly and has received the following aberrational names. **nigra** *Fr.*: The two central bands are confluent at the costal and posterior margins, forming black spots, or the whole median area is dark, the red of the ab- *eremita.* domen usually weaker. **eremita** *O.* (20g): Forewing and abdomen smoke-brown or blackish grey, the former *atra.* with black markings. **atra** *Linst.*: Forewing uniformly black, without markings, hindwing greyish brown, ab- *lutea.* domen black. **lutea** *Auel* is a light form in which the central bands are interrupted; the red colour of the ab- *flavoabdominalis.* domen is equally deep almost to the thorax. **flavoabdominalis** *Schultz* has the abdomen yellow instead of red; *subfusca.* **subfusca** *Schultz* ♀ is distinguished by everything which is black in true *monacha* being yellowish brown, and the *obsoleta.* abdomen being also yellowish brown instead of red; in **obsoleta** *Schultz* the dark transverse bands in the median area of the forewing are absent, while they remain in the basal and outer-marginal areas. All these names were given to European specimens. — The eggs are laid in August on various trees, preferably conifers; they are oval, light brown or light red. The larvae hibernate when young, remain together in batches and are fullgrown in June. They are then whitish grey to blackish, with grey hairs, red and blue warts, and a dark longitudinal dorsal line which is interrupted or broadened into spots in places. The larva belongs to the few species of Lepidoptera feeding both on conifers and on deciduous trees, but they are most damaging to conifers. The species is the most important moth economically and about the most dangerous insect to our forests. A large amount of literature treats of the "Blach Arches" and its destruction, which has always been very difficult and on which large sums are expended annually. All attempts at destruction, such as picking off the larvae and pupae by hand, attracting the moths by fire, the ringing of the trees, infesting the larvae with bacteriae, etc., have so far only had temporary or insufficient results. — Pupa golden glossy red-brown or dark brown, with reddish hairs dorsally and rather long anal point, in crevices of bark, loosely attached by a few threads. Moth from the end of July until about September, in most years in moderation, but sometimes in great abundance, resting on tree-trunks. The ♂, which easily flies away when disturbed, gives off a chirping sound when held with the wings closed while beating time with its head. When taken off the tree the ♀ folds its wings like a butterfly, and curves the end of the abdomen towards the head and projects the ovipositor. The moth is rare scarcely anywhere in its area of distribution, but on the whole occurs more abundantly in the East than in the West.

atlantica. **L. atlantica** *Ramb.* (20 g). ♂ smaller and stouter than that of *monacha*, with similar markings, but without a discocellular spot and without any dots near the base of the wing. Both wings dark brown, sparsely dusted with black and grey. Markings pure black. Fringes of forewing like the surface of the wing, those of the hindwing pale reddish, both with darker spots. Pectinations of antenna light yellow. Abdomen reddish with dark transverse markings; ♂ 35 mm. ♀ larger, 43—45 mm., ground-colour of wings lighter, forewing with black longitudinal streak in the basal area and black costal spots, as well as three proximally and one distally in the marginal area, while the darker median area is sharply bounded by a black transverse stripe on both sides, enclosing on the discocellular a lighter reniform, anteriorly open, spot with black edges, and being slightly lighter in colour at the costal margin. Hindwing slightly lighter at the base. Fringes and abdomen about as in the ♀, pectinations of antenna brownish. Andalusia, Mauretania. The ♂♂ fly already soon after dark, in June, and frequently come to the light.

aboleta. **L. aboleta** *Stgr.* (21 a), from Palestine, has the forewings narrower and more rounded at the apex than *Ocneria terebynthi*. They are dirty clay-colour, dusted with blackish and with blackish transverse markings, through which run three lighter transverse lines contrasting with the ground-colour. The second, slightly zigzag, transverse line has the darkest edges, wihle the outer one is usually only edged by black spots. Fringes light reddish chequered with dark, and not chequered at the uniformly light grey hindwing. Underside of both wings dirty light grey. Body of ♀ with reddish hairs, of ♂ with dirty grey ones.

destituta. **L. destituta** *Stgr.* (21 a). Reddish brown-grey, slightly irrorated with white, forewing especially in the ♂ darker, before and beyond the centre of the forewing two dentate narrow curved bands, in the middle and beyond the base two obsolescent transverse smears, only distinct in the costal half. — Armenia.

grisescens. **L. grisescens** *Stgr.* (22 f), from the Island of Askold in the Ussuri district, is dirty grey; a dark, very obsolescent, transverse band runs through the centre of the forewing. Discocellular altogether or partly black. A few obsolescent darker small spots in the marginal area. Smaller black marginal dots; these are also recognisable on the underside, which is otherwise without markings. Hindwing dirty light grey with a very obsolescent dark outer margin.

lapidicola. **L. lapidicola** *H.-Shäff.* (23 e), from Asia Minor and Mesopotamia, has the forewing smoky brown and ashy grey with the indication of three or four darker transverse bands not reaching the distal margin. Hindwing pale rose-red, with sharply defined marginal band narrowed at the anal angle. Fringes of both wings light, darker at the veins. Abdomen rose-red, darker at the apex. In ♂ the abdomen bears a darker longitudinal dorsal line, which is at the most only indicated in the ♀, the marginal band of the hindwing is much more sharply defined and the forewing in the basal half bears two black oblique transverse lines close together and not reaching the hindmargin, as well as a more obsolescent sublimbal band recognisable as far the hindmargin, and a similar marginal band. ♀ 38 to 52, ♂ 32 mm. — *urbicola.* **urbicola** *Stgr.* (21 a) is a form from Smyrna, Beirut, etc., having grey hindwing with a narrower light median band; the forewing has more distinct transverse bands, reaching the hindmargin, and a discocellular spot of light and dark scales. — *phoenissa.* **phoenissa** *Rogenh.*, from Smyrna, Palestine, and Cyprus, has the hindwing lighter, quite unicolorous, never bearing a sharp marginal band; on the underside of the hindwing there is a round dark spot in the middle of the costal margin, which is scarcely visible in *lapidicola*; shaft of antenna of ♂ whitish instead of reddish. — *libanicola.* **libanicola** *Stgr.*, from the Mts. of Lebanon, has the forewing almost unicolorous, but bearing two dark transverse bands close together in the marginal area. — *mardina.* **mardina** *Stgr.*, from Mesopotamia, has the forewing darker, almost unicolorous, with two darker median bands below, which are especially distinct in the ♂. — Larva dirty brown-grey, venter yellowish, dorsally, especially on segments 3 and 8, there are lighter spots; warts black or blue black, only now and again with short tufts of hair. Lives on almond-trees. Pupa densely covered with brown hair.

komarovi. **L. komarovi** *Christ.* (21 a), from Armenia, has the forewing dark brown-grey with a slight yellowish tinge, without markings or with three thin indistinct dark transverse bands: the hindwing orange-yellow with the uniformly black-brown costal and distal margins apparently interrupted by the slightly lighter veins, with dark fringes. Abdomen orange-yellow, with dark transverse spots above. Head and thorax brown.

oberthueri. **L. oberthueri** *Luc.*, from Tunis, has the forewing in the ♂ light greyish brown-yellow, with a narrow dark transverse median band, partly separated into spots, and a similar sublimbal band really only consisting of two transverse lines placed close together and divided by the lighter longitudinal lines; discocellular black narrowly edged with white on the outside; costal margin with small indistinct black spots. Hindwing orange-yellow with black sublimbal band, which is broad anteriorly and thin and pointed posteriorly. Fringes yellowish with very indistinct dark spots. 30 mm. The ♀ has the forewing greyish brown with lighter veins and irregularly arranged light longitudinal and oblique smears. Hindwing pale reddish grey with the marginal band broader than in the ♂ and not so sharply defined. 40 mm.

obfuscata. **L. obfuscata** *Walk.* (22 f) has in the ♀ reduced wings, which are however better developed than in *L. incerta Walk.* The ♂ is greyish brown and resembles *L. incerta*, the postmedian double lines are more regular, and the hindwing bears a dark central lunule at the apex of the cell, as well as a dark marginal band. ♀ light ochreous with darker discocellular vein. Larva light brown, with short dorsal tufts and long lateral brushes and with light lines along the middle and at both sides. — Kashmir; also distributed in India. Our figure is taken from the type in the British Museum.

obsoleta. **L. obsoleta** *Walk.* ♂ brown with reddish abdomen. Forewing with dark dusting and indistinct antemedian and postmedian lines in double halfmoon-shape; discocellular spot black, luniform, no spot in the cell. Hindwing light blackish brown. Head pale rose-colour around the eyes and below, legs and abdomen the same, the latter bearing a dark dorsal stripe. In the ♀ the abdomen, moreover, has black lateral spots and a dark apex; hindwing reddish in the dorsal area. ♂ 42, ♀ 72 mm. Described from North-*albolunata.* India. — **albolunata** *Moore*, from Kashmir, is more variegated with black on the forewing, and there are *vinacea.* white lunules between the postmedian lines. — **vinacea** *Moore* is a ♀-form perhaps only occurring in South India, which is wine-grey with indistinct brown zigzag lines on the forewing, a dark discocellular and mar-*bhascara.* ginal spots. Hindwing with a narrow brown marginal band. — **bhascara** *Moore* has the hindwing rose-colour, with a broad brown marginal band, the forewing being light fawn, densely irrorated with brown and bearing *sobrina.* several transverse zigzag lines. Described from North India and Darjiling. — **sobrina** *Moore* (according to Swinhoe a separate species!) is distinguished by the sharply marked transverse lines of the forewing; inner *iris.* margin of hindwing rose-red. ♀ with yellowish abdomen. — The form **iris** *form. nov.* (20 f), from Central and Southern China, a number of specimens of which from Seitz's collection from Hongkong are before me and to which also the specimens figured belong, are larger in the ♀; forewing brown like bark, slightly iridescent bluish with very indistinct greyish markings, the brown ground-colour only appearing as spots and in bands more or less separated into spots; all the grey parts are dusted with large brown dispersed scales recognisable with the naked eye. The most distinct of the light markings is a double row of transversely placed lunules about 7 or 8 mm from the margin, the lunules being convex proximally and their pointed horns being directed marginad. In a lighter median area difficult to distinguish as such, which is about 5 mm broad at the hind margin and almost 10 in the middle, and is separated from the double row of light lunules just described by an almost linear sharply zigzag brown band, there is an irregular transverse row of 6 or 7 small black spots, of which the one at vein 1 b appears as a longitudinal streak, the one at the discocellular as a transverse bar. The brown antemedian area is divided into wedge-shaped longitudinal streaks by the lighter veins. In the basal half the light colour predominates, but with a large brown spot in the middle and at the costal margin and one or two black longitudinal streaks in the middle. Underside grey-brown, darkest in the marginal area and at the costal margin, with blackish triangular transverse discocellular spot and an almost straight shadowy light transverse band, partly separated into spots and about 9 mm from the margin in the middle, slightly curved marginad in the hindmarginal area and therefore being here only half as far distant from the margin as in the middle. Dark fringe-spots also visible below. Hindwing light greyish brown, darkest above in the marginal area, but without discocellular spot, below with one, as well as with brownish veins and costal and distal marginal areas; in the last a lighter transverse band, which is not however the continuation of the same band on the forewing. Head and thorax brown like the wings, between the eyes a lighter smear, collar red, coxae and base of femora red, legs brown with black bands. End of abdomen brown, above and at the sides reddish (most strongly reddish beyond the centre), and with a greyish median longitudinal stripe above, blackish below, segments partly red at the hindmargins. Antennae black, shaft lighter in places. ♂ smaller, colour of wings as in the ♀, but the median area does not bear any black dots except three on the discocellular, which area sometimes confluent. Underside of both wings lighter, greyish white, only brownish at the costal margin; the light transverse band of the ♀ is only indicated here by the dark line bounding it at the inner edge; the fringes appear almost without spots below. Abdomen greyish, lightest below, without a reddish tinge, above with darker median longitudinal stripe, laterally a row of deep black spots. Anal tuft greyish. — The moths are common in August on tree-trunks, especially on those of older Cassias; the species is distributed over India and China with the exception of the North, and Formosa.

concolor. **L. concolor** *Walk.* (20 f). ♂ whitish yellow or light sulphur yellow, prominently spotted with black also on the head and thorax. The black transverse lines of the forewing very irregular and more or less interrupted. Hindwing light greyish to blackish, with traces of a submarginal band or lighter spots. Abdomen red, with no black spots or only indistinct ones above. ♂ 56 mm. ♀ with whitish hindwing and yellow abdomen; 88 mm. — **superans** *Walk.* Ground-colour of forewing pure white, abdomen of ♂ above with distinct black spots. ♀ with whitish abdomen, smaller than true *concolor* (65 mm). — In **carnecolor** *Moore* both sexes are said to have a yellow abdomen and whitish hindwing with the indication of a sublimbal band; markings of forewing narrower and less distinct than in true *concolor*. Himalayas. — **micans** *Feld.* has white ground-colour above on the wings and body, with slight yellowish tinge, on the anterior half of the abdomen three or four, on the mesonotum one black round spot, but without the black longitudinal stripe on the thorax of true *concolor*. Hindwing with narrow greyish submarginal band and transverse stripe at the costal margin. ♀ 70 mm. India, also in the Northern Himalayas. *superans.* *carnecolor.* *micans.*

L. lucescens *Butl.* ♂ is allied to *L. ascetria Hbn.*, but larger, the spots in the basal area replaced by a single zigzag line; the line which crosses the cell is almost twice as far from the two connected discal lines, and the latter are less incurved towards the base; hindwing light glossy greyish brown-yellow instead of yellowish white, as well as without distinct submarginal wavy line, but the margin is broadly grey. Discocellular spots grey. Expanse 45 mm. — Japan. *lucescens.*

L. marginata *Walk.* and *pusilla Fldr.*, which latter is probably nothing but the ♀ of *marginata*, belong to the Eastern Himalayas and have not yet been recorded from our area*). But in Palearctic Kashmir occurs the form **nigra** *Moore* (20 f). All these forms are recognisable by the broad black margin of the hindwing, which sometimes, when confluent with the dull greyish basal area, occupies the greater part of the wing. *nigra* differs from *pusilla* in the brownish ground-colour of the forewing and the entirely black hindwing, the head and thorax are moreover spotted with ochreous and the abdomen is ochreous with black transverse lines, lateral spots and anal tuft. ♀, forewing with broad deep black confluent bands, with white interspaces. *marginata.* *nigra.*

L. moesta *Swinh.* ♂ & ♀, palpi and antennae brown; head, thorax and forewing dark grey; on the forewing two darker grey transverse lines, viz., one antemedian angled outwards above the centre and crenate, the other discal parallel with the outer margin, not far distant from the latter and slightly dentate. At the apex of the cell a grey halfmoon-shaped spot. These markings all very indistinct. Abdomen and hindwing lighter grey, suffused with reddish, without markings. Underside uniformly light grey without markings. ♂ 38, ♀ 43 mm. — Kashmir (Kangra), Kasaoli. *moesta.*

19. Genus: **Ocneria** *Hbn.*

Closely allied to the preceding genus, but the antennae of the ♂♂ mostly rather longer, veins 4 and 5 of both wings and the distance between 2 and 3 comparatively shorter; the wings of the ♀ more strongly rounded, smaller or very little larger than those of the ♂. The moths altogether smaller, the colouring more uniform and the markings simpler. The larvae differ from those of *Lymantria* by the absence of the brightly coloured knob-like warts. *Ocneria* is most strongly represented in Europe and especially the Mediterranean region, while *Lymantria* inhabits especially the Eastern and South-Eastern countries of the Palearctic Region, and is also widely distributed in the tropics.

O. detrita *Esp.* (21 c). ♂ sooty brown black, with black, regularly curved and outwardly finely dentate, postmedian transverse line and black discocellular bar. Abdomen with narrow black transverse bands. ♀ rather smaller, sooty black-brown, with dark discocellular spot, but otherwise without markings. ♂ 34, ♀ 30 mm. Larva on deciduous trees, blue-grey with white dorsal line, cup-shaped vermilion warts on segments 9 and 10, and otherwise with grey, black and reddish yellow warts; head blue-black; it hibernates when half-grown and pupates in May, the pupa being blackish grey with brown tufts of hair. — Here and there in North Germany, Austria and North and Central Hungary, in the lowlands of the Bukovina and as far as Bulgaria, Sarepta, also in South-Eastern France and the South-Eastern Taurus. At the boundaries of its area the moth is often rare, otherwise locally very common; it is on the wing in June and July, and the larve prefers low oak-bushes. *detrita.*

O. terebinthi *Frr.* (21 b). Light bluish ashy grey with white dusting, which is most distinct towards the inner margin and base, also filling in the obsolete central lunule. Veins suffused with reddish grey. Both transverse stripes rather indistinct, undulate line absent. Hindwing reddish grey, unicolorous. Abdomen (♀), palpi and femora (♂♀) rose-red. ♀ 34, ♂ 29 mm. Larva according to some authors not different from *detrita*, other observers claim to have found differences. Asia Minor, Balkan countries, Armenia. — **unicolor** *Stgr.*, from Mesopotamia, has the forewing almost unicolorous, without transverse lines. *terebinthi.* *unicolor.*

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*) *L. beatrix*, from Java, also with broad black margin of the hindwing, is often considered synonymous with this species, but I believe it to be a different species.

terebynthina. **O. terebynthina** *Stgr.* (22 h), from Mardin in Mesopotamia, is closely allied to the preceding species, but the forewing is narrower, more pointed at the apex, size smaller (♂ 20—31 mm), forewing dark grey with three conspicuous white spots, the fringes very sharply chequered with light and dark. Hindwing whitish grey. The palpi appear to be shorter and slenderer than in *terebinthi.*

raddei. **O. raddei** *Chr.* (21 b), from Armenia, is white, with an orange-yellow anal tuft in the ♀; in both sexes the forewing dotted with black, the dots forming an antemedian and a postmedian transverse row, both being slightly curved, and each ending at the costal margin with a larger dot; proximally to the posterior end of the outer transverse row there is an abbreviated similar row parallel with it. Fringes of forewing with dark spots, those of the hindwing without. 13—16 mm. Transcaucasia — Staudinger has described a form from *vestalina.* Mardin in Mesopotamia as var. **vestalina**: this has the forewing almost unicolorous, without dots.

flavipalpata. **O. flavipalpata** *Stgr.* (21 b). Closely allied to *Ocn. raddei*, but has the forewing distally much narrower, of more uniform width, etc. Size 38 mm. Colour chalky white; forewing finely irrorated with blackish, with a small black spot at the lower angle of the cell; on the underside dirty yellowish grey. Hindwing, especially in the outer half, very slightly dusted with light grey; beneath only the costal margin is narrowly yellowish grey. Palpi chrome-yellow, extending beyond the white frons. — Valley of the Jordan.

signatoria. **O. signatoria** *Chr.* (21 b), from Transcaucasia and Turkestan, is light reddish grey in the ♀, slightly ochreous, with the indication of a band at the base and two obsolescent transverse stripes, the anterior one of which is curved, the posterior one undulating and geminate; the discocellular spot forms a deep black circular ring which is prolonged distad into a small streak; in the cell there is a small deep black dot and below the cell in the basal half one or two similar ones. Fringes with the indication of darker spots. ♂ rather darker, more brownish than the ♀. Both sexes with the hindwing unicolorous or only very slightly *poenitens.* darker distally. — A form from Palestine has been described as **poenitens** *Stgr.*, which is smaller, lighter yellowish grey and with the markings still more indistinct, and which is perhaps better regarded as a distinct species.

rubea. **O. rubea** (*Schiff.*) *F.* (21 c). Reddish or yellowish grey with narrow dark submarginal line on both wings, darker veins and white discocellular spot narrowly edged with black. ♂ with or without an antemedian indistinct dark transverse line; the ♀ often with a fairly distinct darker marginal band, reddish on the forewing and brownish yellow on the hindwing. Hindwing sometimes a little lighter than the forewing. In Germany *rubrior.* the species only occurs in the Rheingau, where it is represented by var. **rubrior** *Fuchs*, which is bright red on both sides. Otherwise the species occurs in Spain, Southern France, Italy, Southern Tyrol, Moravia, Lower Austria, Western Hungary, Transsylvania, Dalmatia, and North-Western Africa. — Larva yellow, slightly brown above, with two blackish stripes; it hibernates, and lives until May on low oak bushes hidden in daytime. It changes into a light brown pupa with yellow hair, the moth already emerging in barely a fortnight.

ledereri. **O.** (?) **ledereri** *Mill.* (22 h), from Sicily, is said to resemble *Dasychira selenitica*; antennae strongly pectinate, wings with two, only slightly distinct, transverse bands and rather lighter fringes. About 33 mm. According to Staudinger *ledereri* is about of the same size and has on the whole the same colouring and markings of the wings as his *Ocneria nora*; the third transverse line is acutely angled inwards in its lower portion (below median vein 1) as in *Oc. nora.* The antennae have long pectinations, about as in *O. terebinthi*, the palpi are shorter than in *O. nora*, abdomen slenderer than in *terebinthi.*

nora. **O.** (?) **nora** *Stgr.* ♂: Forewing smoky brown, sprinkled with yellowish grey scales and bearing three black transverse lines and a narrow central lunule. The first transverse line is situated close beyond the base, the second is very distinct and broad, at one-third the length of the wing, and the strongly dentate third 2 mm before the distal margin, being very acutely angled inwards in its inner portion and edged with light on the outer side. Underside of forewing rusty brown with blackish costal margin, the median cell being almost entirely filled in with black. Hindwing rusty brown, broadly irrorated with blackish costally almost to the apex, this irroration being particularly distinct on the similarly coloured brown underside. 33 or 34 mm. — Marash in the Taurus.

samarita. **O.** (?) **samarita** *Stgr.* (21 c), from Palestine, has in the ♀ ashy grey wings with dark irroration and three black transverse lines; discocellular spots narrow, obtusely angled, about halfmoon-shaped, light with black edges; fringes dark with small white checks. Hindwing dirty clay-grey, densely irrorated with blackish, with narrow black outer margin, and lighter indistinctly chequered fringes. Underside of both wings blackish grey, with a submarginal lighter transverse line (forewing) or transverse band (hindwing).

amabilis. **O. (?) amabilis** *Chr.* (21 d). The ♂, from Askhabad, has light olive-brown forewing slightly suffused with grey, with three blackish brown transverse bands: one before the centre narrow, distinctly curved distad, another nearly in the centre just as narrow but less curved, and a marginal band two or three times as broad. Fringes like the forewing, indistinctly chequered with dark. Hindwing orange-yellow, with fringes of the same colour, and deep black band slightly narrowed posteriorly, at the distal and costal margins. Beneath both wings orange-yellow, forewing slightly lighter than hindwing, black at the costal margin as far as beyond the centre, and further distally with a black spot and a similar marginal band and spot in the middle of the cell; the underside of the hindwing similar to upperside.

20. Genus: **Ocnerogyia** *Stgr.*

Unknown to me; the systematic position not recognisable with certainty from the inadequate description; it is even questionable whether *Ocnerogyia* really belongs to this group (Inarcolatae). It is compared with *Orgyia*, but is said to be most closely related to *Ocneria*. The antennae have a very slender shaft, and much longer, slenderer and more widely separated pectinations than the species of *Orgyia*, and are moreover longer than in the latter, being slightly more than half the length of the costal margin of the forewing. Thorax and vertex appear to be clothed with long thin hair, also the frons. Palpi extremely small, lying on the hairs of the forecoxae. — Only one species:

amanda. **O. amanda** *Stgr.* from Mardin in Mesopotamia. Forewing uniformly dark brown-grey, hindwing ochreous brown with brownish grey fringes. Thorax and vertex light brown-grey, frons and abdomen ochreous brown, discocellular spot indistinct. 31 mm.

21. Genus: **Albarracina** *Stgr.*

This genus is also only known to me from Staudinger's description. Antenna of ♂ long, bipectinate and pointed, nearly as in *Ocneria terebinthi*, that of the ♀ with short pectinations, shorter than in *terebinthi*. Thorax clothed with long hairy scales. Tegulae much raised. Thorax laterally clothed with long hair. The hindtibia with two pairs of fairly long spurs. End of abdomen of ♀ with long hairs in wreath-shape. Forewing more elongate than in most species of *Bombyx*, outer margin very convex, inner margin only slightly shorter than costal one. Venation „rather different from that of the species of *Bombyx* (especially the median cells are not nearly so short)". Only two species.

korbi. **A. korbi** *Stgr.* (21 d), from Albarracin in Eastern Central Spain, is light ashy grey; forewing with blackish irrorations, veins darker, distally a transverse row of 6—7 black spots and near the margin a row of black transverse bars. Hindwing whitish dusted with grey (♂), or grey with white fringes (♀). Underside of forewing uniformly black-grey, with sharp white costal margin and whitish spots before the outer margin, the fringes appearing almost chequered with black white. ♂ 30, ♀ 33 mm. — From Jaffa in Syria var. **syriaca** *Standf.* (22 h) has been *syriaca.* described, which is of a lighter colour throughout: fringes more uniformly grey and all the markings of the insect more obsolescent, hindwing and abdomen of the ♂ almost uniformly white; moreover, the forewing is narrower with the margin less curved and with a dark stripe extending into the apex. ♂ 29—30, ♀ 32—33 mm. — Bang-Haas has described without naming it a ♀-form of *korbi* from Tunis (in Iris XIX, p. 130), which is distinguished by the strong black macular wavy line being absent or nearly so. 35 mm. I suggest calling this form var. **deundulata** *Strand.* *deundulata.*

baui. **A. baui** *Standf.*, from Palestine (according to Staudinger's Catalogue) or Syria (according to Standfuss) is slightly smaller than *korbi* (♂ 26—28, ♀ 28—31 mm), slenderer, antenna of ♂ with shorter pectinations, forewing broader than in *syriaca* and lighter above, the hindwing however darker, being grey, but with snow-white and indistinctly chequered fringes. Forewing chalky white, veins with black scales, there being also black shading in the cell and around it; in cells 2 and 3 deep black wedge-shaped spots, in cells 4 and 5 these are absent (in contradistinction to *syriaca*); costal margin with deep black oblique streak before the apex. Underside of forewing dark grey, partly lighter at the margin, that of the hindwing of ♂ white, with obsolescent discocellular spot, black shading at the dorsal margin and an irregular row of spots parallel with the outer margin; the hindwing of ♀ beneath light grey.

22. Genus: **Topomesoides** *gen. nov.*

Most closely allied to *Topomesa* *Walk.*, but vein 8 and 9 both terminate at the costal margin, 10 originating closer to the cell than 7, the discocellular of the hindwing is more oblique (the cell anteriorly considerably shorter than posteriorly) and veins 6 and 7 of the hindwing are separated at the base, 7 really originating from the anterior margin of the cell. — Type: *T.* („*Aroa*") *jonasi* *Btlr.* (19 h, 3).

jonasi. **T. jonasi** *Butl.* (1911), from Japan, is light sulphur-yellow on the forewing with large brown discocellular spot lighter in the centre, and a reddish brown longitudinal costal marginal spot at the apex, which at its inner end is prolonged into a sharp point posticad and inwards. Hindwing silky white, yellowish distally. Body white, thorax yellowish, head and teeth of antennae orange. Palpi, tibiae and tarsi ochreous. Wings beneath sulphur-yellow, forewing with ochreous costal margin and dull orange-coloured apex of the costal area. 25—40 mm. — Plate 19 h 4, represents a very large ♂ which according to observations by Prof. SEITZ flies at the same places as the small form of *jonasi* and seems to be a seasonal form; I name it
gigantea. **gigantea** *form. nov.*

23. Genus: **Perina** *Walk.*

A small South- and Eastern-Asiatic genus which stands rather isolated in some respects. The ♂♂ have very tiny palpi and long narrow forewing with a very long oblique margin, veins 4 and 5 on a short stalk, while 2.3 originates from the hind angle of the cell and 7 and 8 from towards the apex. On the hindwing also 4 and 5 are stalked, while 6 is absent. In the ♀ the distal margin of the forewing is less oblique, veins 4 and 5 originate from the apex of the cell and 6 is present.

nuda. **P. nuda** *F.* (21 d). ♂ with orange-coloured head and legs, black antennae and greyish brown body, abdomen with white transverse lines, anal tuft orange, forewing hyaline with the inner basal area clothed with brown scales, hindwing dark brown with hyaline apical area. The ♀ light ochreous with orange anal tuft. — Larva greyish green with short black dorsal brushes and longer pencils at both ends of the body, as well as greyish black lateral tufts; above a green longitudinal band with white line and red spots. Pupa greenish, beneath spotted with reddish brown and black. ♂ 38, ♀ 50 mm. China, Japan, India, Ceylon.

24. Genus: **Porthesia** *Steph.*

This genus, distributed over the whole old World, but not rich in species, is closely allied to *Euproctis*, but easily distinguished from it by the absence of vein 5 in the hindwing.

similis. **P. similis** *Fuessl.* (21 i) is white, and very like *Euproctis chrysorrhoea*, but more pure silky white, anal wool and hairs at the apex of the abdomen of the ♀ golden yellow. In Central and South Eastern Europe, absent from the Southern Balkan Peninsula, but distributed in South Italy, Armenia, Altai, Amurland, Corea, Japan and China. — Not rarely, especially in the ♂ sex, varieties occur with small dark spots on the
auriflua. forewing: **auriflua** (*F.*) *Hbn.* has three spots at the inner angle, forming an oblique transverse row, and one spot
nyctea. in the basal area near the hindmargin; **nyctea** *Gr.-Grsh.* has only one spot at the inner angle as well as
trimaculata. one in the basal area like *auriflua*; **trimaculata** *ab. nov.* is like *nyctea*, but has another spot on the
quadrimaculata. costal margin opposite the subbasal inner marginal spot, while **quadrimaculata** *ab. nov.* has a fourth subapical spot. The two last-named forms are from Eastern Asia, where spotted specimens of this species seem on the whole to be commoner than in Europe. — Larva black, with sparse black grey hairs, a brick-red divided longitudinal dorsal stripe, white lateral stripes and black head, segment 1 black streaked with yellow, the tubercles on segments 4 and 11 also black. The larvae disperse soon after emerging from the eggs, which are covered with the anal wool of the ♀, hibernate singly and pupate at the beginning of June. Pupa blackish brown in a whitish cocoon. Moths from the end of June until August common everywhere in the distribution-area, but not in such numbers as the very similar *Euproctis chrysorrhoea*, and not noxious. The moth comes to the light and when at rest folds the wings very steeply in roof-shape; when touched it feigns death, lying on its side with the wings closed.

melania. **P. melania** *Stgr.* (22 h), from Mesopotamia, Kurdestan and North-Eastern Asia Minor, has white wings with rather broad black band before the outer margin partly separated into spots, light ochreous brown antennae and in the ♂ deep dark brown abdomen with brownish white anal tuft, in the ♀ with ochreous brown anal tuft. On the underside the costal margin of the forewing is slightly suffused with darker as far as beyond the centre. Head, thorax and legs white, palpi blackish. Abdomen beneath white in both sexes, suffused with dark above in the ♀, especially distally. ♂ 25—30, ♀ 35 mm. — Sometimes (in the ♀ always ?)
melaniodes. the forewing bears a black inner marginal spot (**melaniodes** *ab. nov.*).

rebeli. **P. rebeli** *Haberh.* is said to be very similar to *Euproctis karghalica*. At the apex of the cell there are three black dots, the middle one of which is larger than the other two. Without marginal spots. 30—32 mm. Larva 12 mm long, with black hair, at the head two long grey tufts of hair, on both sides a white stripe, white rings on segments 1 and 2, a black hairy tuft on segment 3, from which a red stripe runs to the end-segment, being divided by long black hairs. Legs reddish brown. Lives in May on Palarius austrialis near Slivno.

xanthorrhoea. **P. xanthorrhoea** *Koll.* (= subdita Moore) (23 a). ♂ white, slightly suffused with darker, hindwing with a broad (especially costally) but not sharply defined blackish marginal band; anal tuft orange; pectinations *flavonigra.*

of antennae brownish. ♀ without any darker suffusion. — **flavonigra** *Moore* has light ochreous forewing and black hindwing, white at the base, fringes ochreous. — Larva black, head striped with white, segment 1 with red band and long black brush, dorsally with yellow spots. Throughout India, also in the North (Kashmir). ♂ 28, ♀ 37 mm.

torasan.

P. torasan *Holl.* (23 a), from Shirakawa in Japan, is (♂) uniformly orange-red, hindwing above suffused with a darker tint in the centre, forewing beneath with a small dark brown smear not far from the apex. Expanse 22 mm. (According to Hampson i. l. this species is not an *Euproctis* but a *Porthesia.*)

tsingtauica.

P. tsingtauica *spec. nov.* (23 e). One ♂ from Tsingtau (Coll. Seitz). Forewing bright ochreous with three black submarginal spots, the two posterior ones of which are larger, more sharply defined and quite as broad as long, distant from the margin by about their breadth, and indistinctly divided by a lighter scaled vein, while the anterior one, which is about equally distant from the distal and costal margins, is almost a mere dot. Between the two anterior ones of these spots and the discocellular there are black scales, which sometines may perhaps form a distinct smear. In the centre of the basal area there are also black scales, which are more dispersed. Hindwing light dark brown, lighter at the base and inner margin, some veins with yellow scales at the apex, the fringes golden ochreous like those of the forewing. Underside of both wings ochreous, but paler than the upperside of the forewing, apical half of forewing (but not quite to the margin) slightly irrorated with brown. The entire body covered with ochreous hair, very little or scarcely at all lighter beneath: pectinations of antenna brown. Eyes deep black. Expanse 18.5, length of forewing 9 mm. Length of body 8.5 mm.

25. Genus: **Euproctis** *Hbn.*

This genus is widely distributed in the Indian Region, and a good many species also occur in the southern districts of the Palearctic Region, but in Europe only one is found. It also occurs in Africa and Australia. Palpi obliquely porrect, projecting beyond the frons. The remains of the tongue often distinct, middle tibia with one pair of spurs; hindtibia with two pairs. Antennae bipectinate in both sexes. ♀ with large anal tuft. In the forewing veins 3, 4 and 5 originate near the angle of the cell, 6 from the upper angle or shortly beyond it, 7, 8, 9 and 10 are stalked, 10 originating nearer the apex than 7. On the hindwing veins 3 and 4 are stalked or originate from the angle of the cell, 6 and 7 stalked, 5 much further from 6 than from 4. The larvae are moderately hairy, but the hairs sometimes urticate, causing inflammation. The cocoon with which the hairs of the larva are intermixed is also very dangerous for the human skin, the urticating faculty remaining long after the moth has left the cocoon. The moths belong to the commonest species of their countries almost everywhere; by day they rest either on trunks or boards, or on the underside of leaves, from which they can be flushed by beating the branches. The moths are nearly all fairly unicolorous, mostly yellow, more rarely white.

chrysorrhoea. *punctigera.* *punctella.* *nigrosignata.* *flavescens.* *abdominata.*

E. chrysorrhoea *L.* (= auriflua Esp.) (21 e). White, abdomen of ♂ and anal tuft of ♀ dark yellowish brown. Not rarely the forewing of the ♂ bears black dots, which are more numerous and form rows in ab. **punctigera** *Teich*; the name **punctella** (21 e) may be given to specimens bearing only a few isolated dots. In ab. **nigrosignata** *Bandermann* the dots are confluent forming streaks, especially near the base of the forewing, and are also found on the hindwing. In ab. **flavescens** *Rebel* the forewing is yellowish brown and without markings. The abdomen of the ♂ is sometimes much darker, and may even be quite black. I name the latter form, which occurs for instance in the Bukovina, **abdominata** *Strand.* — In South and Central Europe, in Southern Scandinavia, Livland, Mauretania, Asia Minor, Armenia, Sarafshan district, perhaps also Japan. — Larva black, with greyish brown or reddish brown hairs, red spots dorsally or two red dorsal lines, black tubercles on segments 4 and 11. Head brownish black. In the autumm it emerges from the eggs, which are covered with the anal wool of the ♀, and hibernates when young in a common nest made of leaves spun together. When the trees have lost their leaves in the autumn the nests remain, looking like dark bunches of leaves on the bare branches. In order to prevent the larvae from becoming noxious, these bunches must be cut out of the tree and burnt. Already at the end of March the young larvae begin to leave the nest at intervals, but return to it again in rainy or frosty weather. The full-grown larva, which slightly resembles that of *Porthesia similis*, pupates at the end of May or beginning of June, and the moth appears from the end of June until August; not rare anywhere, but only occurring in abundance in some years.

flava.

E. flava *Brem.* (= subflava *Brem.**) (21 e). Light ochreous, forewing above from the middle of the inner margin to the cell with an only slightly distinct oblique stripe formed of black specks, without discocellular spot. ♂ 30, ♀ 35 mm. The type-form has black spots at the apex of the forewing; this is *intensa.* not the case in **intensa** *Butl.* from Japan. In the latter the dark median band is moreover slightly more distinct, and is divided at or shortly before the centre into two narrow bands almost reaching the costal margin. *bipunctigera.* Amur, Ussuri, Corea, China, Japan. — ab. **bipunctigera** *Strand* ab. nov. In ♂ and ♀ there are in the costal half of the marginal area of the forewing two black dots, usually with a lighter edge, forming a transverse row, two or three mm apart and only half as far from the margin; these spots, to judge from the specimens before me, are more or less distinct in most cases. Yokohama and North China (Museum Berol., type from Yokohama).

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*) This species was erected in 1861 by Bremer as *Aroa flava*; in 1864 he repeated the original description, giving a (very bad!) figure, and changed the name to *subflava* without giving any reason or referring to his former description. But the reason was doubtless that he believed the name *flava* to have been preoccupied. But this is not the case, if *Bombyx flava F.* is treated as unrecognisable, and the original name of Bremer's species must therefore be reintroduced. Swinhoe, in his revision of the *Lymantriidae* of the Old World (1903), has neglected to do so, although he particularly mentions that the name *flava F.* cannot be employed.

straminea. **E. straminea** *Leech* (23 a), from West and Central China, is light yellow, face whitish, palpi dark, abdomen light grey-brownish, anal tuft white variegated with orange (♂) or brown (♀): Forewing light yellow, with a dark median band which is interrupted by the veins, forked before the median vein, not reaching the costa; no apical or submarginal spots. Hindwing silky white. Underside white; forewing with an interrupted dark subcostal stripe and a dark smear on vein 3. ♂ 33—40, ♀ 42—48 mm. Allied to *E. flava intensa Btlr.*

niphonis. **E. niphonis** *Butl.* (= squamosa *Butl.*, raddei *Stgr.*) (21 e, f). ♂ greyish smoke-colour, forewing above densely covered with black and yellow scales, costal margin broadly leather-yellow, likewise the outer margin, which is sparsely scaled with black, discocellular spot black. Hindwing smoky grey. Head and collar ochreous, antenna blackish, thorax light leather yellow, abdomen brownish. Underside of wings brown, costal and distal margins partially leather-yellow. 36—37 mm. ♀ (21 e) ochreous; forewing above leather-yellow with a broad reddish smear between the cell and the inner margin, not reaching the base, and black discocellular spot; base white, with black subbasal spot. Hindwing with black discocellular spot and straw-coloured underside. 47 mm. Japan, Corea, China, Amur, Ussuri district. — FIXSEN describes specimens from Corea which differ in being smaller (length of forewing 18 mm) and less woolly; body slenderer, abdomen blacker, with golden yellow anal tuft; wings above dark black-brown with the exception of the margin and a broad pointed stripe along the costal margin, which are golden yellow; at the costal margin not far from the apex the black spot is very sharply indicated, on the underside of the forewing the whole *coreana.* area is black. This form has been named **coreana** by STAUDINGER and is perhaps a different species from *niphonis*. Larva until June on Ostrya.

piperita. **E. piperita** *Oberth.* (21 e) resembles *flava Brem.*; ground-colour bright yellow, markings violet-brown, with black dots, forming a broad transverse median band extending distad, not quite reaching the costal margin and usually united to a large basal spot, so that only a small triangular spot remains yellow between the two at the inner margin. Behind the curve of the median band there are two small dark spots close above one another, while there is a third before the apex and a fourth close to the inner margin. Underside pale yellow, suffused with blackish in the middle. Hindwing pale yellow above and below. ♂ 26, ♀ 35 mm. In true *piperita* the median band is said to be like the head of a dog („a la forme d'une tête de chien") and the basal spots are not mentioned in the original description, however the description is very poor. If the basal spot is really absent in true *piperita*, the form described above would have to be kept separate as a good *snelleni.* variety under the name of **snelleni** *Stgr.* — Described from Amurland, is also said to occur in Japan, South and West China.

pulverea. **E. pulverea** *Leech* (21 f), from Japan and Corea, is similar to *piperita*, but is smaller and has no dark markings apart from brown scales which are sparsely distributed from the base almost to the margin, forming a kind of a mantle-shaped mark, whose outer margin bears a few silvery spots. Hindwing and underside of both wings leather-yellow without any markings.

conspersa. **E. conspersa** *Butl.* (21 f), from Japan (Yokohama), has the forewing ochreous, the basal two-thirds being dusted with black scales, with the exception of a light angulate band close before the basal third; at the distal edge of the black area there is also an indication of a lighter band; two black subapical spots. Hindwing deeper ochreous than the forewing. Underside of forewing with white inner margin, the basal three-quarters of the wing suffused with light brownish. 36 mm. According to LEECH the ♂ is sometimes deep *choka.* chocolate-colour: ab. **choka** *nom. nov.*

staudingeri. **E. staudingeri** *Leech* (21 f), from Japan, is deep leather-coloured or bright ochreous; forewing with a purple brown basal smear and an elbowed central band constricted in the middle and at the costal margin and merging together with the basal smear at the hindmargin; discocellular spot black, large and round. Hindwing without spot. Head and thorax orange, abdomen velvety black, orange at both ends. Underside leather-yellow, forewing darker in the centre.

E. latifascia *Walk.* (= antiqua *Walk.*) (21 f). Head, thorax and wings dull white, abdomen blackish with orange-yellow anal wool and whitish base. Pectinations of antennae brownish yellow. — **postica** *Walk.* has greyish brown abdomen with white anal tuft, while **abdominalis** *Moore* is said to differ from *postica* by the longer and narrower wings. In ab. **basiatra** *ab. nov.* the base of the costa of the forewing is black and there is a black smear at the inner angle. ♂ 32, ♀ 48 mm. Kashmir; also distributed in the Indian region.

latifascia. postica. abdominalis. basiatra.

E. flavinata *Walk.* (23 a), from China, also distributed in India, has in the ♂ orange-yellow head, thorax and forewing, the latter with deeper orange spot at the apex of the cell and indistinct ante- and postmedian transverse lines, which diverge towards the costal margin and are scaled with black in the intervening area. The markings are often very obsolescent. Abdomen and hindwing lighter, ♀ with brown anal tuft.

flavinata.

E. sulphurescens *Moore* (21 h). from Kashmir, also distributed elsewhere in India. ♂ ochreous white with black abdomen and orange anal wool, forewing with the indication of a median band towards the inner margin, hindwing lighter. ♀ with ochreous abdomen.

sulphurescens.

E. montis *Leech* (23 a). ♂: Forewing yellow, a band consisting of sparse black dusting from the middle of the wing to the inner margin. Hindwing white suffused with yellow, with a silky gloss. Head and thorax orange. Abdomen black with the exception of the first and last segments, which are orange. Underside silky white. Abdomen and legs yellowish. West and Central China; the type-specimen came from Chang-Yang.

montis.

E. lunata *Walk.* (21 g). ♂ light ochreous, with large black discocellular spot. ♀ whitish ochreous, with ochreous brown anal tuft. ♂ 34, ♀ 38 mm. — Larva brown with long tufts of hair anteriorly, posteriorly and laterally, and with square white dorsal spots on the thoracical segments and on segments 5 and following. — Kashmir, also elsewhere in India, especially in the North-Western Himalayas.

lunata.

E. cervina *Moore* (23 a). In the ♀ head, thorax and forewing brownish yellow, the latter with median light lines elbowed outwards on the discocellular, and postmedian regularly curved lines. Fringes of both wings yellow, hindwing and abdomen brownish. ♂: head yellow; thorax, abdomen and wings ochreous white, slightly suffused with brown; forewing without light lines, margin of wings yellow. The species was first described from Ceylon. — In the Palearctic region a variety occurs which in the ♂ has darker wings with less prominent light lines, the hindwing also being darker (**kashmirica** *form. nov.*).

cervina. kashmirica.

E. vitellina *Koll.* (= gamma *Walk.*, princeps *Walk.*) (23 a), from Kashmir. ♂ light ochreous, forewing with a dark median band with a light edge, forked at the hinder angle of the cell and not reaching the costa, and with one or two submarginal black spots towards the apex; hindwing lighter. ♀ with ochreous anal tuft. In the form **comparata** *Walk.* the black submarginal spots are absent. — Larva black with white dorsal and lateral spots and on each segment a small rusty red hump bearing white hairs.

vitellina. comparata.

E. plana *Walk.* (= discinota *Moore*) (21 g). ♂ reddish yellow, forewing light orange-yellow, usually slightly dusted with black, a rusty red band from near the base of the costa to the middle of the median vein and from there straight to the inner margin; a postmedian band excurved at the cell and a black discocellular spot; hindwing lighter. ♀ with obsolescent bands. ♂ 44 to 54, ♀ 60 to 72 mm. — Larva dark brown with deep red lateral warts with white hairs, the anterior dorsal warts with white hairs and the posterior ones with silky brown ones.

plana.

E. icilia *Stoll* (22 g). Like *plana*, but the whole basal area of the forewing purple-brown, and often merging together with the postmedian band beyond the cell. ♂ 38 to 48, ♀ 54 mm. — Larva purple-brown with short grey hair-brushes, reddish lines and light-spotted dorsal warts. India, also the North-Western Himalayas.

icilia.

E. albodentata *Moore.* Body brownish white, forewing olive-brown, veins and margins lighter; forewing with a postmedian and also an antemedian elbowed light line, the two converging towards the inner margin, and with triangular white marginal spots. Hindwing light ochreous brown, with whitish apical area. ♂ 45 mm. Kashmir, Burma.

albodentata

E. bipunctapex *Hamps.* (21 h). Reddish brown, a triangular apical area enclosing two sharply defined round spots, the costal margin, a rounded triangular inner angular area on the forewing and a broad marginal band on the hindwing yellow; a brown discocellular spot is sometimes visible. China, Kashmir, also on Indian territory.

bipunctapex.

E. variana *Walk.* (= pusilla *Moore*) (23 b). Distinguished from *flavinata* by the smaller size, more prominent light lines of the forewing and the absence of black dusting between them. The orange cell-spot mostly absent. ♀ lighter and without markings. In North-India and China, also on Formosa.

variana.

E. argentata *Leech* (23 b), from Japan, has orange forewing, the basal three-fourths dusted with

argentata

brown, distally with an irregular row of brown spots bearing silvery scales; this row is interrupted between rows 5 and 6 and does not extend beyond 7. Hindwing ochreous white. 24 mm.

susanna. **E. susanna** *Stgr.* (21 i), from Palestine and Arabia, is pale ochreous, forewing with two curved orange transverse lines, between which there are large black scales irregularly distributed and before the outer margin there is a transverse row of such black scales; the inner one of the two transverse lines is placed at one-fourth the length of the wing, is slightly excurved and somewhat obsolescent in the middle, the outer one, slightly curved like the figure 6 is at two-thirds. Hindwing unicolorous, in the ♂ brighter ochreous than in the ♀, and the same is the case on the underside, which is without markings. 18 to 35 (usually 22 to 26) mm.

charmantinti. **E. charmantinti** *Vuill.* (21 i). Forewing and all fringes golden yellow; hindwing yellowish brown, sometimes with a slight lead-coloured tinge. Beneath, both wings are yellowish black with yellow margin. Body and legs likewise yellow. 24 mm. Southern Algeria; one ♂ caught in June by Dr. Seitz in Egypt; in this specimen the hindwing appears rather lighter than the forewing, especially on the upper side, instead of the other way about (see the figure in Nov. Lépid. pl. 11, fig. 2), but nothing is to be seen of dark transverse bands in the abdomen which are visible in the figure, but not mentioned in the text.

karghalica. **E. karghalica** *Moore* (= flavosulphurea *Gr.-Grsh.*) (21 i). Forewing white with a yellowish tinge and greyish white scales. Discocellular spot large, ochreous, ring-shaped, a row of small sublimbal spots of the same colour, which is usually broadly interrupted in the centre. Hindwing white. Abdomen of ♂ golden yellow, of ♀ grey with black rings and golden yellow anal wool. Underside white, costa fo forewing dark brown in ♂. Central-Asia, Amur.

atomaria. **E. atomaria** *Walk.* (= apicalis *Walk.*) (21 h) is distinguished from *bipunctapex* by the deeper reddish brown colour, narrower yellow band on the forewing, and the hindwing only having a yellow marginal fine, instead of a band. ♂ 28 to 30, ♀ 38 mm. Larva olive-green, with sparse fine hairs, reddish dorsal band and black warts on segments 4, 5 and 11. Distributed from Kashmir over the whole of anterior India to Ceylon.

lactea. **E. lactea** *Moore*, from Eastern Turkestan, is uniformly white with a yellowish tinge. Abdomen with yellow apex. Underside paler, costal margin of forewing and palpi ochreous brown. Antennae light ochreous brown with white shaft. Foretibiae with ochreous brown tuft of hair. 32 mm.

bimaculata. **E. bimaculata** *Walk.* (21 h). White, with very large angulate black rounded discocellular spot, ♀ with
lutescens. golden orange anal tuft. ♂ 38, ♀ 50 mm, but varies not a little. ab. **lutescens** *Walk.* has the head, thorax and
bigutta. forewing slightly ochreous; **bigutta** *Walk.* is slightly smaller than true *bimaculata* with smaller discocellular spot. West and Eastern China (Shanghai); also widely distributed in India and, if *celsa Walk.* is not a different species, also in the Philippines.

digramma. **E. digramma** *Guér.* (21 h). Light orange-yellow, abdomen suffused with a darker tone, anal wool orange; forewing with ante- and postmedian elbowed light transverse lines, the interspace dusted with dark, especially
unimacula. towards the inner margin; two subapical sharply marked black spots. Hindwing lighter. **unimacula** *Moore* has only one subapical spot on the forewing, and the abdomen is slightly more brownish. — Widely distributed and common in China and India; also known from Java.

inconspicua. **E. inconspicua** *Leech* (23 b), ♀, from West China, is ochreous; anal wool golden brown, discocellular spot obsolescent, an obsolescent transverse stripe of golden brown scales from the middle of the inner margin to the median vein. Hindwing white with ochreous hairs at the inner margin. Underside dull white without markings. ♀ 46 mm.

unipuncta. **E. unipuncta** *Leech* (23 b), from West China, has light yellow forewing with indications of a darker median band, which are only distinct towards the inner margin, and with a subapical dark spot. Underside white, also the entire hindwing. Abdomen suffused with dark; anal tuft of ♀ dark, of ♂ orange. ♂ 30 to 33, ♀ 44 to 46 mm.

endoplagia. **E. endoplagia** *Hamps.* (23 b). Forewing light ochreous with an obsolescent dark smear in the inner marginal area shortly beyond the centre. Hindwing lighter. ♂ 23 mm, ♀ 29 mm. In the ♀ the dark spot is only slightly indicated. West and Central China.

pauperata. **E. pauperata** *Leech.* ♂: Forewing pale leather-yellow with a dark smear in the inner marginal area before the centre. Hindwing lighter. Underside as above, but with blackened costal area of forewing. ♀ diaphanous dull white, forewing suffused with ochreous grey. ♂ 31 to 35 mm, ♀ 40 to 44 mm. West China.

recurvata. **E. recurvata** *Leech* (23 c). Forewing yellow, basal area darker bounded by a lighter elbowed line; beyond the centre of the wing there is a dark recurved transverse band, which is interrupted by the veins and bounded by a light line on the inner side. Hindwing lighter. Underside light ochreous. 26 to 32 mm. North and Central China.

seitzi.

E. seitzi *spec. nov.* (21 g). ♂: Forewing light ochreous, middle of the costal area whitish; from the middle of the hind margin (4 mm from the base) there runs to the centre of the wing (6 mm from the base) a transverse white band which is so densely irrorated with brown that only a white edge remains on each side about one-fifth the width of the whole band; these two white edges are connected with one another in the middle by an equally narrow white longitudinal streak, and there remain small white interspaces between the brown dots; these two white edges of the band are prolonged forwards vertically to the costa and merge together with the white costal area. The brown band is more distinct at the hindmargin. Fringes unicolorous, scarcely lighter than the surface of the wing. Hindwing above and below greyish white, suffused with ochreous, fringes ochreous. Forewing below posteriorly like the hindwing, costally slightly irrorated with brownish, in the basal third of the costal margin brown. Head and thorax like the forewing above; antennae white with brown pectinations; eyes dark grey with black spots. The hindlegs with white hairs and scales, the forelegs yellowish, especially at the base. Abdomen below white, laterally yellowish white, above black or greyish black. Anal tuft pale ochreous. Expanse 27, length of wing 13. 5, of body 12 mm. — China: Hongkong, 28. VIII. 1891. (Coll. SEITZ). Allied to *E. recurvata Leech.*

scintillans.

subnotata.

limbata.

irrorata.

E. scintillans *Walk.* (21 h). Forewing reddish brown suffused with mauve, and with indications of blackish smears; costal and distal margins sulphur-yellow, this colour not reaching the base costally, at the outer margin the yellow band is three times incurved on the inner side and bears silvery spots at this margin. Hindwing yellow. Head and collar orange. Pectinations of antennae brownish yellow, likewise the abdomen, while the thorax is brown. Underside light yellow, forewing with darker subcostal stripe. Anal tuft orange. ♂ 20 to 26, ♀ 32 to 38 mm. **subnotata** *Walk.* (= justiciae *Moore*) has the yellow marginal band divided into three spots. **limbata** *Butlr.* is larger than the main form and has the wings coloured like *subnotata*, but the yellow costal margin is present, the hindwing light violet brown, with light yellow marginal band. **irrorata** *Moore* has two or three narrow light yellow transverse bands in the basal half of the wing*), the brown colour of the forewing darker. — Larva dark brown with red lateral warts, segment 3 with yellow band, segments 4, 5 and 11 with short brown brushes of hair, segments 5 to 10 with broad yellow dorsal stripe, anal segment with yellow spot. The larva is said to vary greatly, so that some of the forms mentioned above may really be distinct species. — Distributed from Kashmir over the whole of India to Ceylon.

Alphabetical List

of the Palearctic *Lymantriidae* with references to the original descriptions.

* signifies that the form is figured at the place quoted.

abdominalis Eupr. *Moore*, Proc. Zool. Soc. Lond. 1888, p. 398.
abdominata Eupr. *Strand*, Seitz, Macrolep. 2, p. 135.
abietis Das. *Schiff.* W. Verz., p. 55.
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albofascia Num. *Leech*, Proc. Zool. Soc. Lond. 1888, p. 629. *
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algirica Org. *Luc.* Explor. Alg., p. 376. *
alpherakii Dasorg. *Gr.-Grsh.* Hor. Ent. Ross. 25, p. 464.
amabilis Ocn. *Christ.* Rom. Mém. Lép. 3, p. 60. *
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antiqua Org. *L.* Syst. Nat. (X), p. 503.
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approximans Org. *Butl.* Trans. Ent. Soc. Lond. 1881, p. 10.
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atomaria Eupr. *Walk.* Cat. Het. Br. Mus. 4, p. 796.
atra Lym. *Linstow*, Entom. Zeitschr. 21, p. 96—103.
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aurora Lym. *Butl.* Ann. Mag. Nat. Hist. (4) 20, p. 403.

basiatra Eupr. *Strand*, Seitz, Macrolep. 2, p. 136.
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bimaculata Eupr. *Walk.*, Cat. Het. Brit. Mus. 4. p. 836.
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chrysorrhoea Eupr. *L.* Syst. Nat. (X), p. 502.
cinnamomea Aroa *Moore*, Lep. Coll. Atkins., p. 44.
coenosa Lael. *Hbn.* Smlg. Eur. Schmett. *
colon Lael. *Hamps.* Ill. Het. Brit. Mus. 8, p. 56. *
comparata Eupr. *Walk.* Cat. Het. Brit. Mus. 32, p. 315.

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*) These bands are not mentioned in the description and are not alike on the two wings. HAMPSON does not quote this figure in Fauna Brit. Ind., Moths I. p. 483. If these bands should prove to be owing to a mistake on the part of the artist, *irrorata* would be a mere synonym.

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flavoabdominalis Lym. *Schultz*, Ent. Zschr. Stuttg. 21, p. 36.
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lunata Eupr. *Walk.* Cat. Het. Brit. Mus. 4, p. 837.
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lutea Lym. *Auel*, Zeitschr. f. w. Ins. Biol. 5, p. 159.
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6. Family: Thaumetopoeidæ.

This group of moths consisting of about a dozen forms, which until the beginning of this century were always placed with the Notodontids under the generic name of *Cnethocampa*, has now been established as a separate family. This result is especially owing to researches by American entomologists which have proved the Notodontids to be a much more uniform group than one was hitherto inclined to believe, that family forming a refuge for all Bombicoid genera which it was difficult to place. A certain affinity with the Lymantriids induces us to place them after that family. They are confined to the Palearctic Region. Their nearest relatives, which are presumed to be found either among the Lymantriids or the Lasiocampids, are probably certain American forms of the genera *Tolype* or *Hypopacha*, and certain African *Lymantriidae* and Australian *Lasiocampidae*. But their true position in classification has not yet been established with certainty, even modern authors still placing them with the Notodontids. Antennae short, not or scarcely half so long as the costal margin of the forewing, bipectinate to the tip in both sexes (shorter in the ♀); segment with a long tuft of hair directed forward. Eyes naked. No ocelli and no tongue. Palpi very small, hairy and porrect, segment 1 longer and thicker than 2. Thorax covered with erect woolly hair. Abdomen of ♂ with anal tuft, of ♀ with anal wool. Legs with long hair, hindtibiae only with endspurs, no tibia longer than the femur. Wings thinly scaled, hairy, rather broad, distal margin straight, apex and inner angle rounded, scheme of markings uniform (cf. figures, plate 21 and 23), frenulum always present. Hindwing small and rounded, forewing without a tooth at the inner margin. Venation about as in the Notodontids, areole absent, dorsal vein of forewing with basal fork, vein 5 only slightly developed and equally far from 4 and 6. Veins 6 and 7 of hindwing always stalked, sometimes also 3 and 4; 8 originates from the base of the wing and bends down to the middle of the anterior margin of the cell. Flight at night. Wings at rest held in roof-shape.

The eggs are globular and are deposited in clusters or rings and covered with a cement intermixed with the anal wool. The larvae have 16 feet and resemble those of the Lasiocampids; they are stout, cylindrical, short, with uniformly short hair, and with knob-like warts bearing long fine brittle barbed hairs arranged in tufts, which cause violent inflammation on the human skin. On the middle of the back, from segment 4 onward, there are so-called mirror-spots. The larvae are gregarious, living in nests, which they leave at night in regular processions (hence the name „processionary caterpillars") in search of food and to which they return in the same way. They pupate in the nest, forming elongate rounded cocoons intermixed with hair, or they go into the sand to pupate more singly. Beetles of the genus *Calosoma* (*C. sycophanta* L. and *inquisitor* L.) often occur in the nests and destroy the larvae. The caterpillars either march one behind the other or with one in the first row, two in the second, three in the third, etc., up to fifteen to twenty in the last. In *T. processionea* one larva marches in front, another following with its head close to the first, then a third and a fourth marching in the same way; in the next section there are two marching abreast, then three, four, etc., until six or seven march in one row. Towards the end the procession, which is one or two yards long, narrows again and finishes with one or two larvae. Slowly they move along, always the nose of one larva touching the preceding specimen. The hairs of the larvae contain a great deal of formic acid, and moreover ferments are said to increase the inflammation and terrible itching. The inflammation reappears after from two to nine weeks and can be very dangerous, especially in the eyes. The pupae sometimes hibernate twice.

Only one genus:

Genus: **Thaumetopoea** *Hbn.*

The characters are those of the family.

Th. solitaria *Frr.* (23c), from Asia Minor, Syria and European Turkey, is closely allied to the following species, but the hindwing is quite white without any transverse band, at most with a small dark marginal spot at the anal angle, the inner transverse line of the forewing is almost straight and the apex of the forewing more produced. ♂ 25, ♀ 31 mm. Larva in May and June on Pistacea terebinthus; it is fairly densely clothed with long yellowish white hairs. *solitaria.*

T. processionea *L.* (21 k). ♂ with greyish white forewing bearing lighter and darker transverse lines, with an narrow pure white transverse band at the base, and in the proximal half of the marginal area two blackish parallel transverse lines with a narrow white outer edge and anteriorly united by a dark smear; hindwing with an obsolescent greyish transverse band. ♀ on the whole larger, the dark transverse lines obsolescent or absent, hindwing greyish. ♂ 29, ♀ 32 mm. (cf. *pinivora*). Central Europe (with the exception of England), South-Eastern Turkey, Northern and Central Italy and Northern Spain. — **luctifica** *Stgr.* is much *processionea.* *luctifica.*

darker and usually smaller; forewing greyish black; hindwing (also in the ♂) dirty grey. — The processionary larva, which lives on oak, is brownish black-grey above with a row of reddish brown spots bearing long thin barbed hairs. The thoracical segments bear each eight reddish long-hairy knob-like warts, the other segments four each. Sides greyish white with darker indistinct spots, stigmata deep black. The larvae are often very injurious to oak-forests.

pityocampa. **T. pityocampa** *Schiff.* (21 k), the pine processionary moth, is more sharply marked than the preceding species, the median area is distinctly lighter than the subbasal and submarginal areas, hindwing whitish, without transverse band, but with black anal smear. The halfmoon-shaped discocellular spot and the transverse lines of the forewing sharply defined. 34 mm. In southern Europe with the exception of Southern Russia, locally in Baden, in the most southern districts of Switzerland, in Austria-Hungary, Asia Minor, *orana.* Syria. — var. **orana** *Stgr.*, from Algeria, is paler, forewing whitish grey; in var **nigra** *Bang.-H.* (23 c), from *nigra.* Tessin, the light grey colour of both wings of the main form is changed to blackish grey. — MILLIÉRE describes and figures (1886) an aberration from Cannes which is distinguished by the two transverse lines bounding the median area of the forewing being deep black, sharply defined, broad and everywhere equally distinct; basal and marginal areas comparatively light. The white hindwing without dark spot at the anal *insignipennis.* angle. I call the form ab. **insignipennis** *ab. nov.* — Larva bluish black, with a transverse swelling on each segment bearing brownish yellow hair, on the sides whitish grey tufts of hair; head black and underside whitish; it lives on Pinus abies and is often noxious. Pupa reddish yellow in a brownish red barrel-shaped cocoon.

pinivora. **T. pinivora** *Tr.* (21 k). Closely allied to the preceding species, but all the same distinguishable at a glance by the black-checkered fringes of the hindwing. Moreover, the transverse lines of the forewing run differently, converging strongly posteriorly in *pinivora* and being parallel in *pityocampa* or nearly so (cf. figure). *pinivora* and *pityocampa* are distinguished from *processionea* inter alia by the frons being naked in the middle, glossy and traversed by fine transverse ridges, while in *processionea* it is clothed with glossy hair; moreover, the latter species has no spur at the end of the foretibia, while the other two have one. 30 to 35 mm. In North and Central Germany, Western Central Russia (?), and also said to have been *plutonia.* obtained like *processionea* in Southern Sweden. — In ab. **plutonia** *Schultz* the forewing is uniformly blackish, *nigromaculata.* so that the markings of the type are scarcely or not at all visible; hindwing grey. **nigromaculata** *Peters.* has broader and deeper black bands on the forewing and therefore corresponds to a certain extent to ab. *insignipennis* of *pityocampa*. — Larva bluish grey irrorated with yellowish, with eight brownish red warts on each thoracical segment, bearing whitish grey hairs, several similar ones on the abdominal segments, and three longitudinal rows of warts laterally. On Conifers. Pupa light brown, in a greyish white barrel-shaped cocoon.

herculeana. **T. herculeana** *Ramb.* (23 c), from Spain and Palestine, differs from the preceding species in the white ground-colour of the forewing; the latter bears two narrow sublimbal dark bands close together, of which the distal one is slightly broader and dentate at the outer edge, as well as a broad band occupying almost the whole of the basal area but not reaching the base. Sometimes the two sublimbal bands merge *bifasciata.* together to form a single broad band; this form has received the name **bifasciata** *Spul.* While the normal *colossa.* size does not reach 30 mm, a form occurs in Spain and Portugal (**colossa** *Bang.-H.*) (23 d) whose ♂♂ attain an expanse of 35 and the ♀♀ of 40 mm. Markings of ♂ prominent and brown-yellow, almost confluent, while *judaea* the ♀ is almost uniformly brownish yellow. — **judaea** *Bang.-H.* (23 d) is the local form from Palestine; the wings are pure white, the transverse bands blackish, the basal and marginal areas as well as the hindwing pure white with a silky gloss; underside also white, that of the forewing with large blackish shadowy spots originating at the costal margin. ♂ 30, ♀ 35 mm. — Larva blackish brown with lighter segmental incisions, dark brown hairs on the black transverse swellings, lighter longitudinal lateral line and above it blackish warts, and with a blackish brown head. When young the larvae live together in large nests on low-growing plants. Pupa in a brown cocoon.

jordana. **T. jordana** *Stgr.* (23 e) from Palestine. ♂: Forewing white with blackish basal stripe at the costal margin and blackish sublimbal transverse band; the latter is quite one mm. broad, equally broad everywhere and nearly quite straight. The inner margin is narrowly dark almost to the base. Below, the whole costal margin as well as the marginal portion of the forewing is darker. Hindwing white on both sides, only the costal margin slightly darker below. The long-pectinate antennae yellowish brown; thorax above with long white hair. Abdomen yellowish brown, with narrow black rings above. ♀: forewing thinly scaled, dirty grey, unicolorous, hindwing slightly lighter whitish grey. Forewing with a very obsolescent extramedian shadowy band. All fringes (♂♀) unicolorous. Antennae light brown, frons with yellowish brown hairs, thorax grey but with whitish tegulae. ♂ 22 to 30, ♀ 25 to 39 mm. STAUDINGER surmises, probably correctly, that this species should be placed into another genus, for which he proposes the name *Thaumatocampa*; unfortunately here as in other similar cases he has not entered upon a closer examination of the generic distinctions.

Alphabetical List

of the Palearctic *Thaumetopoeidae* with a reference to the original descriptions.

*) signifies that the form is figured at the place quoted.

bifasciata Th. *Spul.* Schmett. Eur., p. 105.

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herculeana Th. *Ramb.* Faun. Andal. Pl. 14. *

jordana Th. *Stgr.* Iris 7, p. 269. *
judaea Th. *Bang-H.* Iris 21, p. 31.

insignipennis Th. *Strand*, Seitz, Macrolep. 2, p. 111.

luctifica Th. *Stgr.* Stgr.-Rbl., Cat. Pal. Lep., p. 113.

nigra Th. *Bang-H.* Iris 21, p. 31.
nigromaculata Th. *Peters.* Ins.-Börse 1899, p. 215.

orana Th. *Stgr.* Stgr.-Rbl., Cat. Pal. Lep., p. 113.

pinivora Th. *Tr.* Schmett. Eur. 10 (1), p. 194.
pityocampa Th. *Schiff.* W. Verz., p. 58.
plutonius Th. *Schultz*, Nyt. Mag. Nat. 13, p. 115.
processionea Th. *L.* Syst. Nat. (X), p. 500.

solitaria Th. *Frr.* Beytr. 3, p. 102. *

7. Family: Lasiocampidæ.

The name *Lasiocampidae* is derived from the larva being covered with shaggy hair. The family comprises about 800 species, some of which are again split up into a large number of subspecies on account of their ready response to different geographical conditions, and also are very variable individually, some aberrations being almost monstrosities. In this family dimorphism, which is not usual among Bombycids, is occasionally very pronounced, e. g. in *Selenophora lunigera-lobulina*, so that if all the dimorphic, aberrational and local forms are taken into consideration, more than a thousand forms are united in this family, a number which is only surpassed by the Arctiids and reached by the Liparids.

They are more evenly distributed over the earth than other families. About 350 forms inhabit the Western hemisphere, and 420 the Eastern. The Lasiocampids are by no means so much more abundant in the tropics than in the temperate zones, as is the case with other groups of moths, the colder district of North America alone appearing especially poor with only 40 forms. The Arctic winter of Canada and the Northern States of the Union with its blizzards and sharp frosts prevents the Lasiocampids, which nearly all hibernate as larvae, from establishing themselves in these countries, and only single species are met with in the other districts of the U. S. A., apart from the warmer south-western states, such as Arizona, New Mexico, etc.

In Europe and temperate Asia also, where more than 200 forms of *Lasiocampidae* occur, only a few go far north, and not one species has followed the Liparids to Greenland and North Siberia. Following the degrees of longitude we find about 70 species in Europe and almost the same number in Anterior Asia and the northern part of Central Asia, as the western forms disappear in nearly the same proportion as new eastern ones appear. In Amurland and the neighbouring temperate China there are about 25 to 30 well-characterised main forms, which, if they were as rigourously separated into varieties as the European forms, would also result in about 50, and in temperate Asia we find 15 species with a large number of varieties. But they are absent on many islands.

The position assigned to the Lasiocampids in the different schemes of classification is somewhat unstable, as they show affinities with several other families of Bombycids. They agree with the Liparids in the peculiar brushes which protrude from the first segment of the larva at the sides of the head, the moths also showing some points of resemblance to the *Liparidae*, especially in the antennae. As in the preceding families (*Arctiidae*, *Liparidae*, etc.) the larvae of the Lasiocampids are protected by the chemical and mechanical properties of their covering of hair, and likewise have the habit of weaving these hairs into the cocoons, whereby the pupa is also protected. The sexual dimorphism, often so excessively developed in the Liparids, is again met with in this family, and the extraordinary difference in size from which the Liparid *Lymantria dispar* derives its name, we find in the same pronounced degree in the Lasiocampid *Suana concolor*.

According to their anatomy nearly all the groups of Lasiocampids examined as yet are rather primitive forms, only the antennae of the ♂ being specialised, as is also the case in other groups of considerably more generalized moths, e. g. the Cossids. In the Lasiocampids it is a result of the clumsiness of many ♀♀ which renders it necessary that the ♂ is equipped with an acute sense of smell. The frons nearly always bears a dense tuft of hair; the palpi are often stumpy, but very frequently prolonged in nose-shape to a sometimes pointed cone. Tongue always aborted; eyes small, strongly convex, often deeply hidden in the wool of the head. Thorax, especially in the ♀, mostly very stout and woolly; legs short, strong, densely hairy. Forewing without frenulum, often with dentate outer margin and strongly shortened inner margin, hindwing almost circular; venation very regular, cell often short, discocellular strong; all the branches almost equally distant from one another at the margin. The median veins fully and uniformly developed. A distribution of the veins as in many Saturnids where the costal system seems to separate from the cubital veins and the inner marginal portion becomes separate from the costal portion by the absence of the transverse vein, does not show itself to any marked degree in the *Lasiocampidae*.

The structure of the body, particularly the constancy of the venation which in spite of considerable differences between many genera is remarkably uniform, accounts for the fast but always unsteady and clumsy flight of the Lasiocampids. The ♀♀ of many species do not seem to fly much; but the ♂♂ are all the more lively and often rush wildly about over brushwood and meadows even while the sun shines. The ♂ of *Lasiocampa quercus*, e. g., is decidedly diurnal, being most lively in the afternoon between two and four o'clock, while I never met with the ♀ in daytime, but at 10 o'clock at night. The ♂ of *Macrothylacia rubi* also flies by day, especially in the afternoon between half past four and six o'clock, the ♀ however only flies by night, and but very little. The ♂ of *Lasiocampa trifolii*, which species only flies by day when disturbed, is on the wing between 7 and 10 p. m. and the ♀ scarcely later. In *Gastropacha* both sexes often fly late at night. In some groups the ♀♀ cannot fly at all on account of the reduction of their wings, e. g. in *Chondrostega* and *Lasiocampa* (*Lambessa*) *staudingeri*.

The colouring is much brighter and more varied than in the Lymantriids. Fiery red (in *Odonestis pruni*) is replaced by a beautiful apple green (*Trabala vishnou*), copper-brown (*Gastrop. quercifolia*) by slate-blue (*Poecilocampa populi*). In the markings there is usually a strong white discal spot on the forewing, beyond which a slightly curved small band bounds the marginal area. But very often this pattern is replaced by an excellent protective colouring, the conspicuous white discal spot being only reduced or quite obsolete, and the transverse bands modified into markings imitating the venation of leaves. In *Epicnaptera*, *Gastropacha*, etc., the wing has exactly the appearance of a dry leaf, and when at rest the insect is very difficult to perceive.

Although resemblance to parts of plants, pieces of bark, etc., is widely distributed among the Lasiocampids, we meet with no sign of mimicry. There is indeed not a single insect of any protected family which the Lasiocampids resemble even accidentally or quite superficially.

The Lasiocampids are very prolific, as in all the species the ♀♀ lay a large number of eggs. According to the weather, this numerous progeny either produces one or several broods or succumbs to diseases, especially flacherie and fungus, such as Isaria farinosa and Botrytis bassii. These diseases frequently already decimate the young larvae, but often large numbers of them grow up until they are ready to pupate, when a large percentage of them dies. Every collector wonders at the huge numbers of blue-haired larvae of *Macrothylacia rubi* found in the autumn. Almost every larva leaving in June the egg, which is laid in clusters of hundreds, flourishes throughout the summer and hibernates in October; but only a restricted number of moths appears in May to propagate the species. Much the greater number of larvae casually met with in the winter is diseased, being infested with the white mycelium of fungus, and often bearing parasitic vegetation, which protrude from the stigma and between the segments as white threads and club-shaped growths.

Beside these plant-parasites the larvae of Lasiocampids are much decimated by parasitic insects, especially Tachinids, some of which are almost entirely confined to the Lasiocampid larvae. The largest of our European Tachinids, Echinomyia grossa, nearly always lives in the larva of *Lasiocampa trifolii*; and Masicera pratensis is especially abundant in *Cosmotricha potatoria*, etc. Many parasites, especially Ichneumons, may be regarded as the protectors of the forests, as they prevent the increase of such noxious insects, especially the genus *Dendrolimus*. The appearance of large numbers of Lasiocampids in especially favourable seasons is in some cases without any practical importance, e. g. the armies sometimes met with in the higher Alps of *Malacos. alpicola*, which feeds on herbage. But if noxious insects appear in such masses, enormous devastations may be the consequence. The genus to which *Dendr. pini* belongs is notorious for this, and these injurious species at once appear in districts devoid of forests as soon as woods of the food-trees are planted, and it is astonishing to observe in how short a time a species usually occurring in single specimens multiplies to such an extent that even the most energetic measures against the pest are without success. At the season of flight the ground in the woods is covered with dead specimens and masses of wings, and at night the moths swarm about the lights and street-lamps in dense clouds like snow-flakes in a storm. Where the climate renders it impossible to fight against the plague of larvae, for instance by putting lime-rings around the trees, the forests are often doomed and the cultivation of the food-plant has to be abandoned.

In the temperate region the Lasiocampids have only one brood; but in many species it is easy to force the larvae so that a second artificial brood may be obtained, which is often visibly different from the first. As an exception so-called incomplete summer-broods also occur in Nature, some larvae developing more quickly and giving the moth in the same summer, while the more slow-growing specimens do not emerge until the next year. It is decidedly necessary for the Lasiocampids to pass the winter as larva and not in the pupal stage. Species the larvae of which are full-grown in the autumn remain in that state throughout the winter and do not pupate until the spring, often, as in *Macrothylacia rubi*, without taking any more food worth mentioning. Sometimes the moth still appears at the very end of the season; e. g., *Eriogaster rimicola* emerges in October, and *Poecilocampa populi* in November. *Eriogaster lanestris* normally flies in the winter, and its Alpine variety *arbusculae* only emerges on mild winter-days, or if such days do not occur, sometimes remains in the pupal stage ten years or even longer.

The moths are short-lived. The larva, usually very large in proportion to the moth, stores an enormous quantity of fat. The ♂ very soon swarms about in search of a ♀; exceptionally it may copulate more than once, but soon afterwards dies, while the ♀ is occupied for some time with depositing a large number of eggs. The eggs are often laid in clusters, sometimes, however, also singly, and occasionally pasted around small twigs side by side, forming regular rings (*Malacosoma neustria*). As regards the food of the larva, the family is polyphagous, attacking trees and herbs, deciduous and indeciduous trees, Monocotyledons and Dicotyledons. It has even been said of *Macrothylacia rubi* to have gnawed at moss, which is shunned by nearly all other larvae, and to have attacked artificial vegetable products, such as bread.

Apart from the interruption caused by the winter, the growth of the larva of the *Lasiocampidae* is very regular and rather slow. The larvae of *Macroth. rubi*, which emerge from the egg in June, are not full-grown until the end of September or October, i. e. after about 14 weeks; those of *Lasiocampa quercus*, appearing in July, are not ready to pupate until the following June, and the larvae of *Gastrop. quercifolia* appear in June and feed until the end of May, excepting the winter months. The length of the larval stage explains the incapacity of nearly all Lasiocampids to produce a second brood in the cooler districts.

Pupation takes place in a carefully spun cocoon often of a very regular shape (*Lasiocampa*, *Eriogaster*, *Diplura*); the hairs of the larva are often used, being placed in an erect position on the surface of the cocoon. In *Dendrolimus* the aciculate spines of the blue collar of the larva are often woven into the cocoon, so as to encircle like a wreath that portion of it which corresponds to the head of the larva and appears to be most in need of protection. Other larvae again, e. g. *Malacosoma neustria*, eject a liquid into the cocoon which becomes a yellow powder when dry falling onto the pupa when the latter is attacked. Other pupae, as for instance *Gastropacha*, are covered with a blue „bloom", and others again are protected by the cocoon bearing humps which are filled with fragments of hair, projecting above the surface and therefore being first attacked by the foe, and are meant to spoil his appetite for further attack, before the pupa itself is even uncovered. Thus the meaning of the curious cocoon of *Trabala vishnou* may be explained, the cocoon bearing two high humps on the middle of the back with a saddle between them giving the cocoon a curious camel-like appearance.

The pupal stage of the Lasiocampids lasts almost uniformly from three to five weeks. The insects emerge at all times of the day and night, but some species only come out at a certain hour. The ♂♂ begin to be lively soon after emerging and commence flying, so that great care must be taken to prevent them from injuring themselves in the breeding cage, e. g. *Diplura loti*, *Trabala vishnou*, *Odonestis brevirenis*, and *Chondrostega constantina*.

The abundance of individuals, especially of the larvae, renders the Lasiocampids one of the families most important in economic entomology. *Malacosoma neustria* is very injurious to fruit growing, and *Dendrolimus* to conifers. The latter species is very difficult to fight against in the south-eastern Palearctic district, where the climate is almost subtropical and allows the production of two broods instead of one, and where the larvae do not therefore hibernate on the ground in the forests, it being impossible on that account to use gluerings. No decided results have as yet been obtained by the artificial propagation of the enemies and diseasegerms of the larvae. The larvae of Lasiocampids do not seem to have many enemies, apart from the parasites mentioned above, as the hairs, which cause inflammation, seem to be equally offensive to both birds and reptiles. Among the birds only the cuckoo, which has a stomach with a felty lining, appears to eat large numbers.

The inflammation, usually slight, resulting from coming into contact with the larvae of Palearctic Lasiocampids is abated by strong bases, such as ammonia, soaps, etc. According to a physician (Dr. Langheinz) the hairs of the larvae penetrating vertically into the skin can be removed by painting the spot with collodium; on removing the coat the hairs are said to adhere to the collodion.

1. Genus: **Chondrostega** *Led.*

Small, inconspicuous species, greyish yellow to brownish grey in colour, with dense long hair. The ♀♀ without wings. Antennae of ♂ with very long and dense pectinations, and at the base a thick tuft of hair, in the ♀ almost simple. Eyes naked or hairy. Frons with a strong horny projection ending beneath in a pointed tooth and above in a strongly projecting and usually triangular plate. Clipeus with a sharp horny transverse ridge. Palpi short, pendant. Wings of ♂ with entire or slightly wavy margin, fringes very long. Costal margin of forewing somewhat concave, inner margin straight, distal margin strongly curved. Hindwing also with strongly curved distal margin. Forewing with 11 or 12 veins, 2 to 10 into the margin, 11 into the apex.; when 12 veins are present 8 forked with 7 (*vandalicia*). Hindwing with eight veins. Cell of both wings open, discocellular veins almost entirely obsolete. Femora with very long and dense hairs, tibiae less woolly, tarsi smoothly scaled; foretarsi very long, foretibiae very short, with two end-claws, the outer one very small the inner one sometimes very long. The genus only occurrs in the Mediterranean countries and Anterior Asia. In the complete development of the dorsal warts the larvae resemble those of the Lymantriids and Arctiids, as well as those of the Thaumetopoeids, but are distinguished by the skin being hairy between the warts, and from the Thaumetopoeids also by the warts on segments 2 and 3 being placed in two rows. Segment 1 with two large warts and on each side two smaller ones, 2 to 11 with two anterior large warts near together and two posterior small ones farther apart and several lateral ones, 12 with 4 warts in a transverse row, 13 with only two.

C. vandalicia *Mill.* (24 a). Body dark greyish brown, forewing of the same colour, basal half darker, *vandalicia.* bounded on the outer side by an ill-defined light transverse band starting at the costal margin and soon becoming indistinct. Hindwing lighter, smoke-grey, with darker marginal hairs. Underside of forewing greyish brown, with darker costal margin, the light band only distinct at the costal margin. Hindwing with narrow light transverse band strongly excurved in the centre. ♀ dark greyish brown, entirely without wings and anal tuft. Castile and Portugal. August and September. Larva in mountainous districts on Gramineae (Nardus), also on Hypochaeris. Stout, blue-black, with small black head and velvety black dorsal spots, warts reddish brown with tufts of hair. Dorsal tufts white intermixed with yellow and black, lateral hairs whitish, ventral hairs dark reddish brown. Stigmata black with narrow grey edge. Thoracical legs black, ventral legs and claspers yellowish. October to April. Pupates in a cocoon on the ground.

C. pastrana *Led.* (24 a). ♂: Body and wings uniformly yellowish grey, with a silky gloss, densely hairy. *pastrana.* ♀ reddish brown, outer hairs of the anal tuft of the same colour, inner ones glossy white. Coasts of the Black *hyrcana. palaestrana.* Sea, Syria, Palestine and Cyprus. — **hyrcana** *Stgr.* (24 a), from Persia, is entirely greyish brown, only slightly glossy. In the middle of the costal margin of the forewing a broader ill-defined spot, and somewhat nearer the apex a smaller and somewhat sharper one. Underside of both wings with narrow dark brown transverse band, strongly excurved, especially on the hindwing, and yellowish grey basal half. — **palaestrana** *Stgr.* (24 a), from Palestine, is smaller, light brownish grey or mouse-grey, very glossy, without markings, and is about intermediate between the two preceding forms. — Larva yellow, with brick-red transverse dorsal bands and dark brown hairs. Incisions and lateral line blackish brown. In Syria on Artemisia.

subfasciata. **C. subfasciata** *Klug* (24 a). Pale yellowish grey, glossy, fore- and hindwing with entire brownish median and submarginal bands. Marginal scales spotted with brown. Underside like upper, bands somewhat darker. Antennae yellowish brown. Egypt. Larva from December to February, when young yellow, after the third moult with yellow hairs and carmine on segments 2 and 3. Pupates in the ground in a felty cocoon intermixed with hair. Moth in October.

longespinata. **C. longespinata** *Auriv.* (24 a). Uniformly yellowish grey-brown, glossy, with the median band quite obsolescent, only slightly sharper at the costal margin of the forewing, but more sharply defined on the underside. Egypt.

fasciana. **C. fasciana** *Stgr.* Similar to *C. pastrana*, lighter yellowish grey, slightly less glossy. Wings on both sides with narrow or somewhat wider, sharp median brown band, which in the forewing is somewhat excurved before the inner margin and in the hindwing above the middle. Antennae greyish brown. Palestine.

constantina. **C. constantina** *Auriv.* Slightly larger than *pastrana.* Upperside greyish brown, with a silky gloss; forewing slightly lighter. Forewing with a light submarginal band, hindwing with a dark one. Underside light greyish brown, both wings with a dark brown median band parallel with the margin. ♀ reddish brown, antennae short and stout. Algeria. Larva black, with short yellow hair and three slightly prominent longitudinal stripes of golden yellow bristles. Warts whitish. Lives on Thapsia garganica.

aurivillii. **C. aurivillii** *Püng.* Similar to *subfasciata.* Ground-colour whitish. Upperside with brown median band and slightly less distinct submarginal band. Median band more distinct on underside than above. Palestine.

2. Genus: **Malacosoma** *Hbn.*

Medium-sized species, reddish brown to greyish yellow in colour, with the body clothed with dense soft woolly hair. Eyes naked or hairy. Antennae of ♂ with long pectinations, in the ♀ the pectinations of medium length or rather short. Palpi with dense but short hair. Margin of wings entire, forewing broad, costal margin almost straight, outer margin rather strongly curved. Costal margin of forewing ventricose at the base; median cells closed. Forewing with 12 veins, 6 and 7 on a short or long stalk, 9 and 10 on a long stalk, 8 from the cell close to the apex or from the stalk of 9 and 10. Hindwing with 8 veins, 8 connected with the cell beyond the base, forming a very small basal cell which sends off one or two strong accessory veins to the costal margin. Femora and tibiae with long hairs, middle and hind tibiae with small end-spurs. — Eggs deposited in a ring on twigs, hibernating. Larva when young in a common web, very limp, slender, cylindrical, with sparse soft hair. Ground-colour of body grey-blue like the head, with reddish yellow and black longitudinal lines, which are straight or curved, continuous or interrupted. Pupa with short soft hair, with a bluish bloom, in a loose soft cocoon, dusted with yellowish. Posterior end stout, conical, stumpy. — The eight to ten species of the genus are confined to the Northern Hemisphere, and are distributed over the whole of Europe, Northern Asia, North Africa and North America. They inhabit the mountains as well as the plains, and sometimes occur in huge numbers. In the Higher Alps they are found beyond the tree-line, occurring at nearly every altitude. The fact that many species are now entirely absent from districts where they occurred formerly in immense numbers is still unexplained.

neustria. parallela. unicolor. maculifera. flavescens. **M. neustria** *L.* (= testacea *Motsch.*, bilineatus *Haw.*) (24 b). True *neustria* is reddish brown, but varies from pale greyish yellow to ochreous and light brown and in all shades to dark reddish brown. Upperside of forewing with two narrow dark oblique transverse bands, one before and another beyond the centre, which usually have light edges, the first on the proximal side, the other on the outer, and converge below the cell or at the inner margin, sometimes being contiguous below the cell; the enclosed space usually darker than the ground-colour of the wing. Fringes of forewing on the costal half with two broad light spots. Underside with narrow dark median band across both wings. In the entire Palearctic Region. — In the form **parallela** *Stgr.*, from Central and Anterior Asia, the bands of the forewing are quite or nearly parallel and slightly excurved. On the other hand the bands may be quite obsolete or absent: ab. **unicolor** *Aign.* In ab. **maculifera** *Koll.* the bands are still indicated by a small costal marginal spot. — **flavescens** *form. nov.* (24 b), from Algiers, has light yellow grund-colour in both sexes. — Tutt separates numerous aberrations according to the combination of colour and markings. First he distinguishes ab. **quercus** *Esp.* (= quercina *Selys*), which has light *quercus.* ochreous ground-colour, the fore wing bearing indistinct bands. Specimens in which these bands are confluent in the centre Tutt names ab. *ochracea-confluens*. When the space between the bands of the forewing is filled with a dark colour so that a dark transverse band is formed we have ab. **annularis** *Geoffr.*; in *ochracea-fracta* *annularis.* this transverse band is interrupted in the centre; in ab. *ochracea-unicolor* it is obsolete. The forms with yellow or brownish yellow ground-colour, to which also the type belongs, are arranged as follows: In ab. **confluens** *confluens.* *Selys* the bands of the forewing touch below the cell; in **virgata** *Tutt* as in the ochreous *annularis Geoffr.* they *virgata.* are filled with a dark colour; in **fracta** *Tutt* they are similar, but interrupted in the centre; and ab. **concolor** *fracta.* *ab. nov.* (= unicolor *Tutt*, nom. preocc.) comprises unicolorous brownish yellow specimens resembling *ochracea-* *concolor.* *unicolor* in markings. — Of specimens with light brown ground-colour Tutt distinguishes ab. **cervina** with distinct *cervina.* yellow bands on the forewing, and, analogous to the preceding, *cervina-virgata* (= neustrius *Haw.*), the space between the bands dark, *cervina-fracta*, the band interrupted, and the uniformly brown *cervina-unicolor*. — The ground-colour of **vulgaris** *Borkh.* is reddish brown, the bands of the forewing distinct; in specimens which *vulgaris.* are also reddish brown these bands may vary as in those of a different colour, and be filled in with dark, interrupted or obsolete (= rufescens-virgata, fracta-unicolor *Tutt*); ab. **pyri** *Scop.* has the ordinary markings, but is *pyri.* rust-red in colour and may be modified into *rufa-confluens*, *rufa-virgata*, *fracta* and *unicolor Tutt* according to the development of the markings. — Eggs dark grey, arranged spirally in broad tightly closed rings on twigs. Larva with white dorsal line accompanied on each side by two thin lines, which are reddish yellow like the broader lateral stripe. Hairs brownish. Head as well as segments 1 and 2 with two velvety black spots, segment 11 with a tubercle; stigmata black. Until June gregarious on fruit-trees and different deciduous trees, sometimes injurious. Graeser once observed the East-Asiatic form *testacea* near Vladivostock in such immense numbers that all the oaks for a considerable distance were stripped bare. Pupa black with short brownish hair, in a soft white cocoon. The moth, which emerges at the end of June and in July, is common everywhere in the area of distribution. The species occurs in some years in such abundance that it is injurious to fruit-growing. — Between this and the following species should be placed the very similar North American forms *M. disstria Hbn.* and *americana F.*

M. castrensis *L.* (24 c). ♂: Head and thorax light yellowish grey, abdomen brown. Forewing above *castrensis.* greyish yellow, with two oblique dark brown transverse bands, the inner one running from the middle of the costal margin to the base, the outer one placed beyond the centre; at the apex of the cell a more or less distinct bridge from one to the other: beyond the outer band a submargnal dark shadow. Fringes yellow with two dark spots. Hindwing dark brown with light fringes. Underside dark brown, forewing beyond the centre with light transverse band, and light apical spot; hindwing greyish yellow at the costal and outer margins, with median band of the same colour. ♀ dark reddish brown, bands of the forewing as in the ♂, but yellowish grey and separated. Underside of both wings with oblique light median band. The species is very variable. Europe to Central Asia, even in the Arctic Region, as well as Andalusia and (probably) Greece. — ab. **taraxacoides** *taraxacoides.* *Bell.* is pale yellowish, the bands are scarcely indicated; hindwing darker. France, England. — **veneta** *Stndfs.* *veneta.* ♂: Head and thorax brown, forewing with brown median band and broad brown margin; ♀ quite dark brown, only with a narrow light central band in the forewing. Northern Italy ab. **hilleri** *Stndfs.*, likewise from Northern *hilleri.* Italy, is uniformly brown in both sexes. — **kirghisica** *Stgr.* (24 c) is considerably paler than the type, with blacker *kirghisica.* band on the forewing and whitish median band on the hindwing, ♀ with yellow forewing bearing indistinct brownish bands. Anterior to Eastern Asia. — As in *neustria* Tutt adds to the already named forms the aberrations consisting of combinations of colour and markings and calls uniformly light yellow ♂♂ with obsolete bands on the forewing, unspotted fringes and greyish brown hindwing, ab. **pallida**; forewing yellow with in- *pallida.* distinct markings, hindwing dark brown: **obsoleta**; with darker bands on the forewing: ab. **intermedia**; when *obsoleta.* the forewing is brown (as in ab. hilleri *Stndfs.*), but with distinct brown bands, we have ab. **brunnea** *Tutt.* Fore- *intermedia.* *brunnea.* and hindwing dull brown, the former with distinct yellow bands and basal area; the centre of the wings enclosed by the bands and the marginal area more reddish: **virgata** *Tutt.* Fore- and hindwing uniformly dull brown *virgata.* without markings: **unicolor** *Tutt.* Forewing reddish brown with yellow bands and basal area as in *virgata*: **rufo-** *unicolor.* **virgata** *Tutt.* Forewing reddish brown without light basal area, only with the two light bands: **bifasciata** *Tutt.* *rufo-virgata.* *bifasciata.* — Eggs grey, similarly to those of *neustria* deposited in broad rings on the stalks of plants. Larva with black spots and dots on a greyish blue ground, with whitish dorsal line edged by two broad reddish yellow, irregularly interrupted longitudinal stripes. Lateral lines also reddish yellow. Stigmata black. Hairs yellowish. Until June at dry sunny spots on heather, Euphorbia and various other low-growing plants; when young gregariously in a loose whitish web. It pupates in May or June. Pupa and cocoon similar to those of *neustria*; the moth emerges in July. Very local and during the last decades becoming rarer in many districts; when flushed it flies by day on meadows and mountain slopes, on the alpine meadows up to almost 2000 metres and locally abundant.

M. franconica *Esp.* (= dorycnii *Mill.*) (24 d). ♂: Deep black-brown, with yellowish median band on *franconica.* fore- and hindwing and light fringes, as well as indistinct subbasal band in the forewing. Median band on the under side broader, with diffuse edges. ♀ unicolorous or with a very diffuse median band, dark reddish brown to rather light yellowish brown. In Germany at the Baltic and in West and South-West Germany, also in *panormitana.* France, Southern Europe, Asia Minor, Armenia. — **panormitana** *Tur.* (23 f), from Sicily, is larger, the wings are broader, more densely dusted with yellow, and in the ♀ bear more or less distinct yellow transverse lines. *lutea.* — In Algeria occurs a uniformly bright ochreous ♀-form, **lutea** *Oberth.* (24 e). — Eggs dirty white, as in *castrensis* deposited on the stalks of low-growing plants. Larva with brownish hairs, blackish blue, the head the same colour, the markings variable, mostly with a narrow light brown dorsal line edged by black velvety stripes, and reddish yellow markings, with a light blue lateral line and reddish yellow one above the legs. Venter white with three black spots. May and June, gregariously until the last change of skin on Triticum, Plantago, Rumex, etc. Pupa dark brown, under stones in a whitish cocoon.

alpicola. **M. alpicola** *Stgr.* (= franconica *Mill.*) (24 e). Very closely allied to *franconica*, smaller, especially the ♀. *prima.* median band of the ♂ narrower and more sharply defined, also on the underside. Higher Alps. — **prima** *Stgr.* (24 e), the form from the Central Asiatic mountains, is distinguished from the European form by the much broader median band and distinct basal band of the ♂. ♀ dark brown suffused with yellowish, and with a scarcely visible band. *othello.* — In ab. **othello** *Blach.* the ♂ is quite uniformly black-brown, the ♀ not being different from true *alpicola*. — Eggs deposited in loose rings on slender twigs. The beautiful larva is bright greyish blue with brownish hairs, the white dorsal line bounded by two broad black longitudinal stripes, which are interrupted with yellowish red. Lateral line very irregular reddish yellow, stigmata black with narrow yellow edge. Especially in damp spots on willows. Pupa dark brown, in a yellow cocoon beneath stones. Nowhere rare in the Higher Alps, but in some years occurring in such quantities that all loose stones and boards are covered with the larvae and whole collections of cocoons are found beneath slabs of lime-stone or slate. Moth in July and August.

3. Genus: **Trichiura** *Steph.*

Grey or predominantly brown species of medium size; ♂ with short dense anal tuft, or the abdomen only sparsely covered with hair (*ilicis*). Eyes hairy. Frons with long conical process, truncate and furnished with a few small teeth at the tip. Antennae of ♂ with long pectinations, with short ones in the ♀. Palpi short, densely hairy. Wings entire, broadly rounded, forewing with straight inner margin and strongly curved distal margin. Costal margin of hindwing strongly ventricose at the base. Fringes long. Forewing with 12 veins, 6 and 7 as well as 9 and 10 stalked, 8 from the upper angle of the cell or from the stalk of 6 and 7; 2 to 9 into the margin, 10 into the apex. Vein 8 of the hindwing curved down to the cell near the base and united with it as far as the origin of 7 or even shortly stalked with 7 (*crataegi*); a strong and long spur curved distad emanates from the very short basal cell and runs towards the costal margin. Cell of both wings closed. Legs covered the tarsi with thick, soft, woolly hair to, middle tibiae with two short end-spurs. — Larva cylindrical, segment 11 with a slight hump (*crataegi*) or higher one (*ilicis*). Body clothed with short sparse soft hair, a few longer and stiffer hairs only on the flat warts. Segments 1 to 3 with a large wart on each side, on both 2 and 3 two dorsal warts in addition; 4 to 11 with two dorsal warts and three smaller lateral warts on each side, all eight in a fairly regular transverse row. Pupa in a strong, parchment-like cocoon, thin-skinned, reddish brown, with several small hooked bristles at the stumpy posterior end. The larvae live gregariously in nests and do not separate until they are nearly full-grown.

crataegi. **T. crataegi** *L.* (= floccosa *Cl.*, vidisideae *L.*, sylvina *Fuessl.*, mali *F.*, avellanae *F.*, bicaudata *Retz.*) (24 e). Light ashy grey to brownish grey or greyish brown, forewing with broad dark median band edged by sharp black lines; the inner border dentate at the costal margin, the outer one strongly wavy. Forewing in addition with indistinct wavy submarginal line; both wings with dark marginal line. Hindwing with narrow dark median band slightly lighter on the outer edge. Underside of both wings with wavy dark brown median band. The ♀♀ are usually darker than the ♂♂, predominantly greyish brown. Europe (with the exception of the Arctic Region, Sicily, Greece and the countries around the Black Sea). A light-coloured form, whitish in the ♂, light yellowish grey in the ♀, in which the dark band of the forewing is more prominent, is distinguished *pallida.* by Tutt as ab. **pallida.** — The Alpine and Northern form **ariae** *Hbn.* (= arbusculae *Pfaff*) (24 f), from the *ariae.* Alps, Apennines, Riesengebirge, etc., Scandinavia, Lapland, is characterised by darker greyish brown colouring. *freyeri.* In Norway two forms of the larva occur. The larva hibernates twice. — ab. **freyeri** *Tutt* (= ariae *Fr.* nec *Hbn.*), also a form of the higher Alps, is light whitish grey in the ♂. The larva lives on an alpine species *castiliana.* of willow. — Another form, **castiliana** *Spul.*, is as yet only known from Castile. ♂ with bright markings, the black borders of the dark band of the forewing less wavy; ♀ light brownish grey. Eggs embedded in the anal wool of the ♀. Larva so variable in markings and colouring that there is sometimes hardly any similarity between the various specimens; the back black, bordered at each side by a broad white longitudinal stripe, which is often separated into spots; there are also red or reddish yellow markings. On each segment a narrow transverse band reddish yellow or light yellow. Head black. Hair brownish, on the dorsal warts black. Until July on Salix, Betula, Crataegus, Hazel, Blackthorn; the form *ariae* also on Alnus. Pp red-brown, very short and stout, with broad obtuse tail-end, in an ovate bluish grey cocoon. The moth in the autumn, not everywhere and in many places of its area of distribution not at all common.

ilicis.

T. ilicis *Ramb.* (24 c). Smaller than *crataegi*, the median band narrower and its margins less dentate; submarginal line more distinct. Hindwing brownish grey. Thorax dark, collar lighter, with a dark border. Andalusia and Catalonia. — Larva slender, tapering anteriorly, reddish brown, evenly hairy, segment 1 bluish grey. Dorsum with 2 yellow longitudinal lines connected at the incisions and enclosing on each segment 3 yellow papillae bearing hair; 5 similar papillae on each side below the yellow line, one larger red-brown wart on segment 11 and two on segment 5; on segments 2, 3, 5 and 10 two black spots behind the middle papilla. May to June, on evergreen Oaks. Pupa in a hard brown cocoon.

4. Genus: **Poecilocampa** *Steph.*

Allied to *Trichiura*; but the frontal process broader and shorter; wings longer and narrower, thinly scaled, transparent, the scales being divided nearly to base into 3—4 hairs; marginal scales shorter. In the forewing vein 8 from the cell or stalked, 9 and 10 on a long stalk, both ending in the costal margin or 9 in the apex; in the hindwing 6 and 7 from a point or on a stalk branching off from the anterior side of the cell. Middle tibiae without spurs; hind tibiae with 2 minute hardly visible end-spurs. — Larva slightly flattened, clothed with sparse and short hair, segment 11 with feeble protuberance, 1—10 without dorsal warts, but all the segments with a wart-like hump; above the legs 1 or 2 warts. Rests in daytime closely appressed to the bark of trees or branches. Pp in a hard cocoon intermingled with earth, red-brown, naked, with numerous hooked bristles at the cremaster. — The moths appear in October and November, when the ♂♂ can be observed flying about street-lamps on warm nights. They are not rare, but do not appear ever to occur in such abundance as is the case from time to time with *Malacosoma*.

populi. *flavescens.* *albomarginata.* *albescens.* *alpina.* *canensis.* *calberlae.* *lydiae.*

P. populi *L.* (= desolata *Müll.*) (24 f). ♂ blackish brown, with whitish or grey collar; ♀ with somewhat lighter wings, black-brown thorax, light grey-brown collar and dark brown abdomen. Forewing with a narrow, white or yellowish, dentate median band and an often indistinct subbasal band. Hindwing with a white, ill-defined, median band. Fringes of both wings with light spots. Underside like upper, somewhat lighter, the bands rather broader and diffuse. Europe, Central Scandinavia to Northern Spain and Sicily, in Asia as far as Amurland. The species varies much in the ground-colour: the base of the forewing reddish yellow and the distal margin yellowish (ab. **flavescens** *Spul.*), base of forewing and distal half of both wings whitish with broad pale fringe-spots (ab. **albomarginata** *Heyne*), predominantly light-coloured specimens with the median and distal marginal areas of the forewing whitish and the hindwing entirely white (ab. **albescens** *Heyne*). — The high-alpine form from Switzerland, **alpina** *Frey* (24 f), is larger, the marginal area clouded with grey and the light subbasal band of the forewing distinct. — **canensis** *Mill.*, from Southern France, is likewise essentially larger than the type-form; the ♂ almost entirely black, the median band of the forewing sharply dentate, the marginal area with light grey clouds, the white median band of the hindwing rather well-defined. ♀ brownish grey. — The Sicilian form, **calberlae** *Ragusa*, usually united with *canensis* and probably not separable from it, has likewise a sharply defined basal band on the forewing, and in both sexes an accessory, external, median band composed of two separate parts, which band, however, occasionally occurs also in *canensis*. — **lydiae** *Krulik.*, from Eastern Russia, doubtless identical with the dark Siberian form, has in the ♂ the body entirely black, the collar being but little lighter, the wings greyish black, without any brown tint; the basal band of the forewing is absent, the median band feebly developed and slightly dentate, parallel with the margin. — Egg oval, flattened, grey or dark brown, deposited singly or in small clusters. Larva greyish yellow to whitish, black above, with light hair on the sides, large black dorsal spots which touch one another in the centre and irregular black spots, sometimes being almost entirely without markings. Venter with black median spots, which are especially large between the abdominal legs. Until July on Oak, Birch, Lime, Aspen, May, Blackthorn, *alpina* especially on Larch (until August). Pp blackish brown, in a hard, dirty grey cocoon intermingled with sand and earth. The moths in the late autumn, from the end of September until far into November, singly, but not rare, and apparently not local. According to Staudinger the specimens from Amurland are darker than European ones and have no light collar.

5. Genus: **Eriogaster** *Germ.*

Eyes hairy. Antenna of ♂ with long pectinations, of ♀ with very short ones or but feebly dentate (*lanestris*). Palpi short, concealed under the dense hair. Wings entire, somewhat shorter and broader than in

Poecilocampa, with more convex distal margin, scaling rather thin, the ground-scales likewise divided into filaments. Forewing with 12 veins, 6—8 free from the upper angle of the cell or 6 and 7 resp. 7 and 8 on a short stalk, 9 and 10 on a long stalk, 2—9 run into the distal margin, 10 into the apex. In the hindwing 8 already from the base united with the cell for a shorter or longer distance, 7 from the anterior side of the cell, 6 from the apex of the cell; basal cell very small, with 1 or 2 simple or branched accessory veins running to the costal margin. Cell closed in both wings. Fringes short. Body and legs clothed with dense long woolly hair. ♀ with broad anal tuft. — Larva elongate-cylindrical, each segment with 2 larger or smaller dorsal spots of reddish yellow felty hair; abdominal legs reddish yellow or light brown. Pp very short, stout, with broadly rounded tail-end, in a hard parchment-like cocoon which is acorn-shaped and has an air-hole and lid. The moths in the autumn; the ♂♂ fly soon after they have left the pupa, which usually takes place late in the afternoon.

rimicola. **E. rimicola** *Hbn.* (= catax *Esp.*) (24 f, g). Uniformly light reddish brown, ♀ with a grey anal tuft. Forewing with whitish discal spot and sometimes a more or less distinct, incurved light median band. Lighter, more yellowish specimens also occur. Central Europe, from Germany and Northern France to Roumania. — *inspersa.* **inspersa** *Stgr.*, from Cilicia (and Lydia ?), is smaller and darker brown than European specimens, the upperside being densely dusted with yellowish scales. Anal wool of ♀ thinner and shorter, more brownish, with whitish median stripe. — Larva ashy grey, with grey or brownish hair, and broad, greyish blue dorsal stripe bordered with black and yellow. On segments 4—10 two brushes of short reddish yellow bristles, 2 and 3 each with a large black dorsal spot also bearing reddish yellow bristles. May—June, gregarious when young, especially on hedges of Black- or Hawthorn, but also on old Oaks. Pp light brown, in a hard, brown or yellowish brown cocoon with lid. The moths are on the wing in August and September, the pupa also lying over in exceptional cases. Sporadical, in the South common in many places, rarer in the North.

philippsi. **E. philippsi** *Bertol.* (24 g). Most nearly allied to *E. rimicola*, somewhat smaller, with lighter ground-colour. Antenna of ♂ more shortly pectinated. Forewing without white discal spot. Anal wool of ♀ silvery grey. Syria. Cocoon lighter than in *rimicola*, dirty yellowish brown, a regular ellipse, similar to that of *Las. trifolii*.

catax. **E. catax** *L.* (= lentipes *Esp.*, everia *Knoch*) (24 g). ♂: body and basal half of forewing bright golden brown, distal area of both wings isabella-colour; forewing with oblique ochreous median band, which is not sharply bounded. ♀ lighter or darker brown, with grey anal wool; forewing with narrow yellowish median band. ♂ and ♀ with sharply marked white discal spot on the forewing and a white costal border to the hindwing. — Egg flattened, brownish grey, deposited around twigs in oblique rows and covered with wool. Larva with brownish grey hair, yellowish brown, with velvety black incisions and blackish brown head, blue lateral spots, which are pencilled and dotted with yellow, and blue-black dorsal spots. Until July in a common web on Black- and Hawthorns, Oak, Poplar and Birch. Pp dark brown, in a yellowish or brown, very hard, barrel-shaped cocoon.

lanestris. **E. lanestris** *L.* (24 h). Very dark brown, with light brown antennae; ♀ with dense grey anal wool. Forewing with a white basal spot centred with dark brown, a prominent white discal spot and a white postmedian dentate band. Hindwing with ill-defined white median band, and beneath with white costal margin. North and Central Europe, Italy with the exception of the South, and from South Russia to Turkestan. Egg cylindrical, deposited in a spiral around thin twigs and covered with grey wool. Larvae gregarious until the last moult in a bag-like, whitish grey web; greyish blue, clothed with greyish yellow and whitish hair, with reddish yellow brushes of bristles as in *rimicola*, abdominal legs bright red. Until July on species of Prunus, Hawthorn, Birch, Lime, Willow. Pp ochreous, soft-skinned, in a hard, smooth, brown or pale barrel-shaped *senecta.* cocoon. — The northern form, **senecta** *Graes.* (= borealis *Car.*) (24 h), from Finland, the Ural Mts., Hungary and Eastern Siberia, is more slaty grey copiously mixed with white. The pupa hibernates twice. — The high-*arbusculae.* alpine **arbusculae** *Frr.* is characterised by the broader and more dentate band of the forewing and darker, more blackish grey, distal marginal area of the ♂. The larva of *arbusculae* is black, with glossy head and light reddish brown hair, the back and sides being spotted with white; abdominal legs yellow. In the High Alps until August on Salix arbuscula, Sorbus ariae, also on Alnus and Betula. The pupa usually hibernates more than once, 2—9 times.

acanthophylli. **E. acanthophylli** *Chr.* (24 h). Body and wings light chocolate-brown; ♀ with dense whitish yellow anal wool. Forewing with a dark-centred white basal spot and sharp white discal one; the white transverse band also sharply defined, posteriorly widened into a spot and then strongly narrowed, curving basad before the hind margin and joining the basal spot; distal marginal area predominantly whitish grey. Hindwing blackish brown, with indistinct light median band. Persia, in the high mountains. Larva gregarious, on Acantophyllum, Acantholimon and Oxytropis; head black, dorsal hair dense, short, yellowish brown, incisions black, at the sides a white interrupted line, venter lighter brown, stigmata bordered with black. Pupates on the ground between clusters of the spiny food-plant in a barrel-shaped, ochreous, very thin cocoon.

neogena. **E. neogena** *F. d. W.* (24 i). Similar to *acantophylli*, blackish grey-brown. Patagia of ♂ edged with grey, anal wool of ♀ strongly mixed with whitish grey. Basal and discal spots of forewing small, the band of the ♂ strongly dentate, interrupted in the centre, the connection with the basal spot indistinct; in the ♀ the band separated into streaks confined to the veins. ♂ with white dentate marginal band, which sometimes consists of single broad vein-stripes and is in the ♀ always separated into narrow streaks. Hindwing dark with the distal marginal area greyish, or predominantly greyish white with brown median band. South-Eastern Russia. Armenia, Altai. Larva similar to that of *lanestris*, blackish grey, with velvety black warts bearing rust-red hair, and with white lateral dots forming longitudinal lines. In May on Acacia. Pupates in a brown barrel-cocoon. Moth in August.

henckei.

E. henckei *Stgr.* (24 i). Dirty smoke-grey, especially on the forewing. Body partly or predominantly white-hairy. Forewing with whitish veins and an oblique pale median band, which is broad in ♂ and narrow or absent in ♀; discal spot large and ill-defined, often absent. South-Eastern Russia. — Larva yellowish grey, washed with black on sides and back, dorso-laterally with 2 rows of large, elongate, black spots which are broadly edged with yellow, especially below. Head and stigmata black, abdominal legs with a triangular black lateral spot low down. On a steppe-plant of which the name is not given (a species of Rhubarb ?). Pp in a very thin yellowish barrel-cocoon.

rueckbeili.

E. rueckbeili *Graes.* Allied to *acantophylli* and *neogena*. Forewing dark grey-brown, with large brown-centred, distally dentate, white basal spot, and large, sharply marked discal one; the first transverse band beyond the centre consists of 3 white spots connected by a thin irregular line, and is less dentate than in *neogena*; the white marginal band narrow, produced distad on each vein into a sharply pointed tooth; in the centre of the costal margin a white longitudinal smear. Hindwing blackish grey, the light transverse band hardly indicated. ♀ with the markings more greyish white, without basal spot on the forewing (normally ?), the first transverse band of even width, the marginal band separated into spots; anal wool dark blackish grey above and light grey beneath. Issyk-kul (Alexander Mts.).

6. Genus: **Lasiocampa** *Schrank.*

Large or medium-sized species, usually differently coloured in the sexes, with broad, rounded, entire or very feebly scalloped wings. ♀ essentially larger than the ♂, only in one species wingless (*staudingeri*). Eyes irregularly clothed with short hair. Frons with a horny process in most species. Antennae in ♂ with long pectinations, in ♀ with short ones or (*staudingeri* ♀) very faintly dentate. Palpi short, shaggy, end-segment distinct, with short appressed hair. Costal margin of forewing almost straight or slightly convex beyond the middle. Apex rounded, distal margin feebly convex; costal margin of hindwing excurved at the base, then straight, distal margin evenly convex. Forewing with 12 veins, 2—5 separate, 6—8 likewise separate or 6 and 7 on a short stalk (*decolorata*, *staudingeri*), or 8 from 9, 10 (*grandis*); 9, 10 on a short stalk, 11 free; 2—9 into the distal margin. In the hindwing vein 6 from the upper angle of cell, 7 from its anterior margin proximally to the centre, 8 approaching 7 rather far beyond the base, and running close along it for a shorter or longer distance or being connected with it by a short oblique vein; basal cell therefore rather large, extending beyond half the cell; the accessory veins running to the costal margin (2 or more) rather weak or entirely obsolete. Cell closed in both wings, discocellular vein in forewing elbowed in the middle, in hindwing near upper angle of cell, the lower angle projecting more distad than the upper. Femora and to some extent also the tibiae with long hair, tarsi smoothly scaled; fore tibiae longer or shorter than the 1. tarsal segment, armed with an apical thorn in some species; hind tibiae with 2 end-spurs.

Although the species differ to some extent in the ground-colour, which may be light greyish white, yellow, brown, brownish red or very dark brown, or an intermediate shade, the scheme of markings is very uniform. Apart from some entirely unicolorous species, we meet with certain markings everywhere: a white discal spot on the forewing usually with a dark edge, and a light postdiscal band across both wings, which may be replaced by a dark band distally bordered with a light colour; some species have in addition a light subbasal band or occasionally a light basal spot on the forewing.

The Palearctic species can be separated into several groups according to morphological detail. Firstly, *staudingeri* with its wingless ♀ (genus *Lambessa Stgr.*) contrasts with the normal-winged species. Among these latter the species without horny frontal process but with end-thorn to the foretibia (*Lasiocampa s. str.*, with *quercus*, *grandis*, *serrula* and probably also *josua*) differ therein from the remaining species, which have a frontal horn, but either have no end-thorn to the foretibia (*Aurivillia Tutt*, with *decolorata*, *datini* and *davidis*) or have such a thorn (*Pachygastria Hbn.*, with *trifolii*, *terreni*, *eversmanni*, *nana* and *concolor*).

However, in the present work it appears advisable to group the species according to the colour and pattern in connection with the geographical distribution, and we distinguish accordingly a *quercus*-group containing the numerous yellow, or brown to dark brown forms with yellow bands belonging to the widely distributed *L. quercus*; a *trifolii*-group, which comprises, besides *trifolii* and its forms *grandis* and *serrula*, predominantly brown-red or reddish grey moths with an usually narrow whitish band and small discal spot; an *eversmanni*-

group with *eversmanni*, *nana*, *davidis*, *terreni* and *josua*, which are greyish yellow or predominantly grey steppe-forms with dark bands; and lastly, a *decolorata*-group embracing the forms without markings, *decolorata*, *datini*, *grisea spec. nov.* and *staudingeri*. The species of the two last groups occur in the eastern Mediterranean countries, with the exception of the Algerian *staudingeri*.

Larvae of a dark ground-colour, bluish grey or black, usually with light dorsal longitudinal lines and light lateral oblique stripes, the hair being variously coloured, of even length, the back bearing moreover short felty hair; incisions without hair.

Pp thin skinned, with obtuse, unarmed tail-end, in a hard parchment-like barrel-shaped cocoon.

a. quercus-group.

L. quercus *L.* (25 a, b, c). Sexes very different in size and colour. ♂ deep reddish brown to chocolate, a broad band on the wings and the fringes of the hindwing brownish yellow. Forewing with a sharply marked white discal spot. ♀ ochreous to light reddish brown, the transverse band proximally with dark border, distally diffuse, discal spot of forewing edged with blackish brown. Underside of ♂ and ♀ as above, the proximal half dark and the marginal area pale. The species is extraordinarily variable. Besides the geographical forms and those colour-varieties which have the character of constant forms, numerous aberrations of individual value only have received names, as have also specimens combining in their colour and pattern characteristics of some varieties, and it goes without saying that all intergradations occur. The species is distributed over the larger proportion of the Palearctic Region, occurring from the Altai to the Canaries, and from Lapland to Sicily, only being absent from the southern districts of the Balkan Peninsula. — Egg deposited singly and not firmly fixed, oval-cylindrical, greyish black, the colour somewhat variable in the various forms, having a yellowish tint in *viburni Guen.* and being reddish in *meridionalis Tutt.* The young larva is black, with regular quadrangular dark yellow dorsal spots. The full-grown larva likewise blackish, densely clothed with hair which varies from greyish yellow to greyish brown; the incisions, which are bluish in the young larva, are very broad and black, each belt bearing two subdorsal white spots, which are sometimes indistinct; at the sides of segments 4—11 whitish or more yellow oblique streaks which emanate from a white lateral stripe, which is separated into short bars and usually prominent, more rarely less distinct. Stigmata white. Head dark, with black markings, segment 1 dorsally reddish yellow, spotted with black, 2 and 3 each with a lateral, prominent, red-centred white ocelliform spot. The larvae emerge in August, are still small when they hibernate, and grow fast in the spring, pupating in May. In districts with a mild winter, e. g. in the South of England, they are about feeding on warm sunny days during the winter. Besides Oak, Birch and Willow they live on various species of Prunus, as well as on Rubus, Calluna, Sarothamnus, and other low plants. Pupation in a regularly ovate, hard, parchment-like, dark brown cocoon. Pp thick, blackish brown, with light brown intersegmental incisions. The pupal stage lasts as a rule only a few weeks, but in the high mountains and the high North the pupa regularly hibernates twice. The moths are on the wing in Central Europe from early July until the end of August. The ♂♂ fly by day very swiftly in a zigzag course, particularly during the sunny hours of the afternoon, searching for the ♀. The latter only lays eggs after it has been on the wing. — *quercus.* In true **quercus** *L.* (25 a) the ♂ is reddish brown, with a broad yellow, slightly curved transverse band, which has a sharply defined dark proximal border, is distally somewhat more diffuse, and narrower on the hindwing; the forewing with a rather small discal spot. ♀ lighter or darker yellowish brown, the basal half of the wings darker with a more or less pronounced reddish tone; the band likewise paler than in the ♂ and proximally sharply bounded. The numerous forms can be arranged in two natural groups, which are also geographically separated, though the distribution-areas overlap in Central Europe: broad-banded forms, among which is true *quercus* and which inhabit the northern half of Europe, and narrow-banded forms which inhabit the southern half of Europe, *spartii Hbn.* being typical for this group. Tutt (Brit. Lep. vol. 3) classifies the various forms, especially those occurring in Great Britain, according to the different tint of the ground-colour, which arrangement of course also applies to Central European examples. Within the various groups the scheme of markings is more or less faithfully repeated. The majority of the forms resulting have naturally only individual value. He distinguishes — 1) ♂-forms: the first group has a reddish brown or rust-brown ground-colour and here belong true *quercus L.*, further ab. ♂ *curvata.* **curvata** *Tutt* with a narrow, strongly curved, yellow or ochreous transverse band; *latovirgata.* ab. **latovirgata** *Tutt* with conspicuously broad band; *semimarginata.* ab. ♂ **semimarginata** *Tutt* with the band normal in the forewing and extended to the distal margin in the hindwing; *marginata.* ab. ♂ **marginata** *Tutt* with the band extended to the distal margin in both wings; and lastly *basipuncta.* ab. ♂ **basipuncta** *Tutt* with yellow basal spot on the forewing; — the second group of ♂♂ has the ground-colour dark chestnut and here belong, besides the narrow-banded *spartii Hbn.*, the broad-banded *roboris* and ab. *guillemotii Trim.* (cf. below), the last two corresponding to ab. *latovirgata* and *semimarginata* of the first group, while *spartii-curvata Tutt*, *spartii-marginata* and *spartii-basipuncta* correspond to the forms of the first group bearing the same designation; — the third group comprises forms with deep purple or chocolate ground-colour, the markings being normal in the principal form ab. ♂ **purpurascens** *Tutt*, and the forms of the *purpurascens.* other groups being repeated (*purpurascens-curvata Tutt, purpurascens-latovirgata, purpurascens-semimarginata, purpurascens-marginata*, and *purpurascens-basipuncta Tutt*): — the fourth group, in which the ground-colour is deep reddish brown, contains only four forms: ab. **brunnea** *Tutt* with normal markings, further *sicula Stgr.* *brunnea.* (cf. below) corresponding to ab. *semimarginata Tutt*, and its subvarieties ab. *sicula-latovirgata Tutt* and *sicula-marginata Tutt.* — 2) ♀-forms: in the first group with the ground-colour yellow or pale ochreous we have first an entirely unicolorous form without markings, ab. ♀ **obsoleta** *Tutt*, and a form with distinct pale bands, *obsoleta.* ab. ♀ **virgata** *Tutt*, the two other forms, ab. *semimarginata* and *marginata* being the same as in the first group *virgata.* of ♂♂ (see above); — in each of the second to fourth groups, which comprise the ♀♀ with the ground either dark ochreous (*ochracea*-group), or reddish yellow (*rufescens*-group), or brown (*brunnea*-group), the four schemes of markings are repeated (*ochracea-obsoleta, ochracea-virgata, ochracea-semimarginata, ochracea-marginata*, etc.). In this arrangement the *virgata*-forms of the ♀ correspond to the ♀ of true *quercus*. — The name **subalpina**, pro- *subalpina.* posed by Agassiz for a form from the Swiss Jura but not described by him, applies probably to a somewhat lighter, yellow-banded variety intermediate between true *alpina* and *roboris*. Specimens of this kind occur also in the Tyrol and in the Romagna. — The high-alpine form **alpina** *Frey* (25 b) is distinguished in ♂ and ♀ *alpina.* by a very dark colour. Band of wings strongly curved, obsolescent in the hindwing; discal spot small. At altitudes from 2000 m upwards; hibernates a second time as a pupa. — The likewise dark-coloured ♀♀ from Lapland, which recall *callunae*, have been distinguished as ♀-f. **lapponica** *Fuchs*; the broad transverse band is *lapponica.* bright yellow. According to Tutt the apex of forewing is more pointed and the distal margin straighter than in the ♀ of true *quercus*. — **callunae** *Palm.* (25 b), the form from Scotland and Sweden, is rather larger than *callunae.* *quercus*; distal margin of forewing more oblique. ♂ very dark brown, with little or no intermixture of red, forewing with a yellow basal spot; band broad, strongly curved, distally diffuse or produced along the veins. ♀ more or less reddish brown, never prominently ochreous, forewing with paler base. The larva on Calluna vulgaris; essentially different when young from true *quercus*, being black after the 1. moult, with large, triangular, orange-red spot on each segment; after the 2. moult likewise black, with orange-red incisions and a grey longitudinal stripe. The full-grown larva is clothed with bright golden brown hair above, the hair on the sides being deep blackish brown and the underside almost black; the light subdorsal line is absent or is only represented by a spot in each incision; the oblique pale lateral stripes are replaced on each segment by an indistinct reddish line. The larva hibernates twice. The cocoon is larger and darker than in true *quercus*. — A South-Siberian mountain-form, occurring in the Altai, may be mentioned in this place, which recalls *callunae* as well as *alpina*, being of a dark colour, with a sharply defined yellow band which is not widened out, and with large and long discal spot and a yellow basal spot on the forewing. The veins are slightly yellowish in the marginal area. We call it **altaica** *form. nov.* — In Russia occurs a very large and dark form with the *altaica.* discal spot of the forewing long and the band broad and strongly curved, somewhat recalling *callunae*; we name it ab. **russica** *form. nov.* (25 a). The specimens figured came from Kineshma. — In **roboris** *Schrank* (= quercus *russica.* *roboris.* *Esp.*) the transverse band is much widened in both wings, but does not extend to the distal margin, while in *marginata Tutt* (see above) it reaches the margin in the fore- and hindwing. — The band extends to the margin only in the hindwing in **guillemotii** *Trim.*, which is found from Hungary to Southern France and also occurs in *guillemotii.* South Europe; this form replaces true *quercus* in the Gironde; the ♀♀ are not larger than the ♂♂, of a reddish ground-colour. — **burdigalensis** *Gerh.*, from Bordeaux, is very near the preceding, but the ♂ has a light-brown *burdigalensis.* shade along the distal margin of the hindwing. — **olivacea** *Tutt* and **olivaceo-fasciata** *Cockll.* (= infumata *Spul.*) *olivacea.* stand somewhat apart from the other forms, both being characterised by the appearance of a greenish tint, *olivaceo-fasciata.* which extends over the whole wings in the former and is restricted to transverse bands in the latter. — ♂♂ with the ochreous colour of the ♀ are ab. ♂ **femini-colorata** *Nicp.*, the wings being slightly darkened towards the *femini-colorata.* base and the veins usually somewhat brownish. — Lastly, we have to mention ab. **fenestrata** *Gerh.* with in- *fenestrata.* distinct band, and the wings more or less thinly scaled, in the outer half sometimes almost transparent. This form has occasionally been obtained together with normal specimens by breeding and is, according to Tutt, probably the result of unfavorable conditions of environment. Such a form occurs also among *sicula*. — Of the South-European forms we mention first **sicula** *Stgr.* (= spartii *Fr.*) (25 c). It is recognized by the narrow and *sicula.* but little curved band, and in the ♂ also by the distal margin of the hindwing being as a rule broadly and uniformly yellow; in the ♀ the band of the hindwing completely merges together with the slightly paler distal marginal area. Sicily and Spain (Andalusia). The larva resembles in all essentials that of *viburni* (see below) or the hair is somewhat paler; lives especially on Rhamnus. The moth from September to November. — In the remaining forms the band is strongly narrowed in both wings: **spartii** *Hbn.* (= scopariae *Mill.*) (25 b) has a *spartii.* narrow yellow transverse band which, moreover, is still more narrowed towards the hind margin on both wings. Ground-colour deep dark brown in the ♂, reddish brown in the ♀, the band being also in the ♀ sharply defined and narrow. Southern France to Central Spain, Northern Italy and the Southern Tyrol, in hot summers also in South-West Germany. The larva does not differ from that of true *quercus*. — *tenuata.* **tenuata** *Fuchs* comes very close to *spartii*; it occurs from Central Germany southward and both sexes are dark-coloured and bear a narrow band, which is very prominent on the dark ground. — *dalmatina.* ab. **dalmatina** *Gerh.*, from Dalmatia, is hardly separable from *tenuata* and *spartii*; the band of the forewing is narrow and that of the hindwing still narrower, and the fringes of the hindwing are dark, having only a thin light edge. — *viburni.* **viburni** *Guen.*, which inhabits Southern France, the Pyrenees, Italy and Sicily, is scarcely distinguishable in the imago from *spartii* and *tenuata*, but the larva is well characterised, its ground-colour being darker, the delicate long hair predominantly white, the short felty hair of the dorsum bright reddish brown, the intersegmental bands narrower. The larva feeds on various shrubs, such as Viburnum, Rubus, Cytisus, Erica arborea, Scoparium, etc., is full-grown early in January and hibernates until May. The moth flies in August, September and Oktober. — *meridionalis.* Here belongs also **meridionalis** *Tutt*, from Southern France (Provence, Alpes Maritimes); ♂ dark chocolate, ♀ yellowish brown, both with a narrow sharply marked transverse band. Larva with orange-red head; the dorsal hairs pure white; rolls up into a ring when disturbed. — *catalaunica.* The extreme form of this series is **catalaunica** Stgr., from Catalonia and Central Italy, in which the band is very narrow, being a mere line, ♂ very dark brown, ♀ reddish brown.

b. trifolii-group.

L. trifolii *Esp.* The numerous forms vary from deep reddish brown to pale yellowish grey, the body being of the same colour as the wings. Forewing with prominent, black-edged, white discal spot, both wings bearing a narrow or more broad, sharply marked or sometimes quite obsolete, whitish transverse band, which is often proximally bounded by a dark shadow on the forewing; some forms have between the discal spot of forewing and the base a dark dentate band, which sometimes bounds a paler basal patch. — Egg oval, flattened, with central depression, lighter or darker yellowish grey shaded with brown or minutely dotted with black, deposited singly. Larva black, hair greyish yellow to yellowish brown, rather short, dense and matted, intermingled with some long thin hairs, and sometimes foxy red on the dorsum. Incisions blackish blue or black, these bands rather narrow, interrupted by three white dorsal longitudinal lines, of which the median one is the most distinct. Head reddish brown, with black dots, frons yellow with black markings, pronotum and anal tergite reddish yellow spotted with black. Segments 2 and 3 each with a red dorso-lateral spot, 4—10 with oblique whitish side-stripes. Underside yellowish red, more or less extended black-spotted. Stigmata white. The larvae emerge late in August and in September, hibernate young and feed up from May or June on various Papilionaceous plants, preferably species of clover, but also on Medicago, Genista, Ononis. The larva of the name-typical form usually in localities with sparse vegetation, while those of ab. *medicaginis* prefer luxurious meadows. Pupa greyish green, in a regular, oval, hard, clayish cocoon. Moths from June until September. — *trifolii.* True **trifolii** *Esp.* (25 c, d) is unicolorously deep red-brown, with sharply marked discal spot, the band of the forewing being prominent in the ♂, diffuse in the ♀. The band of the hindwing is either absent or only vestigial. Distributed from Southern Sweden, the Baltic provinces and England throughout Central and South Europe to Asia Minor, Armenia and Turan. *medicaginis.* With the name-typical *trifolii*, and in some places even more commonly than this, occurs **medicaginis** *Borkh.* (= trifolii *Panz.*) (25 d), which is more greyish brown, the forewing and thorax being densely shaded with grey scales and hairs and the dark shadow at the proximal side of the band of the forewing more prominent in consequence of the paler tone of the ground; the fringes of the forewing dark reddish brown. In Asia Minor this form entirely replaces true *trifolii*. — Also in this species Tutt has given names to the various gradation in colour and markings: *flava.* he distinguishes as ab. **flava** a pale yellow form with distinct dark, transverse, pale-edged band, several modifications of this form being known, one without any markings (ab. *obsoleta-flava*), another with an indistinct pale median band between the lines (ab. *pallida-flava*), which band may be constricted or interrupted (ab. *contracta-flava*). The pale greyish brown forms comprise *medicaginis Borkh.*, specimens of which without markings being *obsoleta-medicaginis Tutt*, while examples with a more or less distinct median band are separated as *virgata-medicaginis Tutt*; here belong also *ratamae H.-Schäff.* and *cocles Hbn.* (see below). The fawn-coloured *cervina.* or reddish grey form with normal markings and distinct median band is ab. **cervina** *Tutt* (without markings = ab. *obsoleta-cervina Tutt*, with constricted median band = ab. *contracta-cervina Tutt*). To the group with red-brown ground-colour belong true *trifolii* and *iberica Guen.* (cf. below); besides these Tutt calls specimens with the basal band of the forewing obsolete in ♂ and ♀ ab. *unilinea-typica*, and a form with obsolescent transverse bands and distinctly pale veins ab. *suffusa-typica*. Lastly, the examples with the very dark red-brown *rufa.* ground shaded with deep red are ab. **rufa** *Tutt*, specimens without markings (= ab. *obsoleta-rufa Tutt*) or with the median band constricted (= ab. *contracta-rufa Tutt*) also occurring. — Besides the Central European forms *iberica.* several well-characterized Mediterranean varieties are known. **iberica** *Guen.* (= trifolii *Dup.*), from Spain, is uniformly red-brown, having no markings apart from the almost black discal spot of the forewing. It occurs singly also in France, Switzerland and Southern Germany. — A form likewise inhabiting Southern Spain is *ratamae. cocles. mauritanica. jugurthina. seitzi. maculosa.*

ratamae *H.-Schäff.* (= trifolii *Hbn.*, retamae *Ramb.*), found also in Morocco: body and forewing yellowish grey, the dark shadow at the proximal side of the band on the forewing, the subbasal band, the border of the discal spot and the entire hindwing dark red-brown with a violet tint; the light band of the hindwing better expressed than that of the forewing and a little more proximal in position. — In **cocles** *Geyer* the light bands are always distinct, that of the hindwing is placed distally to the band of the forewing; the external dark transverse shadow is prominent; but the subbasal band is frequently quite absent; ground-colour dark brown to greyish brown in the ♂, yellowish grey with a more or less extended reddish brown tone in the ♀. Larva without the white longitudinal lines on the intersegmental bands. Central and Southern Italy, Greece (?), Spain, Algeria. — **mauritanica** *Stgr.* (25 d), from Algeria (Lambessa), is very close to *cocles*, but smaller and paler, or at least densely dusted with greyish yellow scales. — In North Africa (Tunis) occur two more forms, which are conspicuous by their size and dark red-brown colour, and deserve being named; one has a very narrow band, **jugurthina** *form. nov.* (25e), the hindwing being unicolorous in the ♂ and the forewing bearing a light basal spot in the same sex; the other form, **seitzi** *form. nov.* (25e), has a very broad band. — The smallest form of *trifolii* occurs in Syria: **maculosa** *Rogenh.* (= bathseba *Stgr.*), characterised by its small size and recalling by its colour *cocles* and *medicaginis*; ♂ varying from yellow to brown, the light band present on the forewing or absent, sometimes also the hindwing bearing a narrow pale band; ♀ light brownish yellow, with the pale band narrow and proximally edged with brown.

grandis. sapiens.

L. grandis *Rogenh.* (= salomonis *Stgr.*) (25 f). Forewing red-brown to yellowish brown, with dispersed yellow scales, indistinct light subbasal band and sharply marked, narrow, white discal one, the discal spot being dark-edged and prominent. Hindwing unicolorous. Underside brownish red, with a diffuse, curved, dark band across both wings. The extreme light form, ab. **sapiens** *Stgr.*, has the forewing entirely clay-colour. Syria and Palestine. Larva larger than that of *trifolii*, dark, with whitish yellow dots in the deep black intersegmental bands, pronotum almost entirely occupied by two large, deep black spots, which are narrowly edged with orange-yellow.

serrula. maroccana. undulata. palaestinensis.

L. serrula *Guen.* (25 f). Greyish brown, dusted with red-brown scales, the narrow dark discal band exteriorly pale-edged and here regularly dentate; the white discal spot large. Hindwing above unicolorous, beneath with a dentate band like the forewing. North Africa, according to Guenée also in Andalusia. Besides the name-typical form there occur in North Africa two others; the one is reddish brown, sparsely dusted with yellowish scales, the band being strongly reduced and only feebly dentate, **maroccana** *Stgr.*, from Morocco and Oran, and the other, **undulata** *Stgr.*, a more eastern form from Algeria (Biskra) is light yellowish grey with a narrow brown band and strongly undulate distal margin. — The species is represented in Palestine by a third form, **palaestinensis** *Stgr.* (26 a), which is much smaller than true *serrula*, with the yellowish grey forewing densely covered with light scaling and bearing a narrower dark band, which is pale-edged on the distal side and less dentate, discal spot smaller; hindwing brown, with a narrow pale transverse band and light fringes. — Larva with a V-shaped spot on the head, a dorsal row of orange brushes of hair and whitish oblique side-stripes, very lively, at once rolls up when touched. On Limoniastrum, Atriplex and Salsolaceae.

c. eversmanni-group.

terreni.

L. terreni *H.-Schäff.* Stouter than *trifolii*, the forewing broadly rounded at the apex and therefore proportionately shorter and broader; in the ♂ pale straw-colour, with dark brown subbasal and discal bands, in the ♀ predominantly brown, with indistinct band which is exteriorly broadly edged with white or is absent; discal spot white with dark edge in ♂ and ♀. Discal band strongly curving distad at the costal margin. Hindwing greyish brown, in the ♂ with a sharply marked band. Underside like upper, band prominent in the ♂, obsolescent in the ♀. Turkey and Asia Minor as far as Syria and Palestine. Early stages not yet known.

eversmanni.

L. eversmanni *Eversm.* (25 f). Straw-coloured, with narrow dark brown bands and brown fringes, forewing more or less variegated with brown in the centre. Hindwing brownish, with strongly obsolescent band. The white discal spot small. The transverse band of the forewing stands occasionally close to the apex of the cell. ♀ lighter and more unicolorous than the ♂, band indistinct in forewing and usually absent from hindwing. August and September, on dry saltsteppes, from the Ural to the southern districts of the Altai. Larva bluish grey with light blue incisions. Hair thin and dense, of even length, yellowish grey; segment 1 cherry-red above, 2 and 3 with a subdorsal spot of the same colour on each side; dorsal line whitish, indistinct on account of the hair, accompanied on each side by a red, frequently interrupted, macular band which is bounded by velvety black spots. Underside und legs reddish yellow. The half-grown larvae feed in the spring on steppe-grasses, the older specimens on Leguminosae, probably Alhagi camelorum (in captivity fed up on Astragalus), and are probably nocturnal; though full-grown the middle of May, they do not spin the cocoon before the end of June and feed until pupation takes place.

nana.

L. nana *Stgr.* (= herzi *Chr.*). Most nearly related to *eversmanni* and at first considered by Staudinger to be a small race of it. Brownish yellow, forewing more elongate, the band more oblique, indistinct or even absent, if present it is placed close to the cell and is connected with the pale-centred brown discal spot. Persia (Shahrud), Ferghana. Larva in May on Lycium barbarum.

davidis. **L. davidis** *Stgr.* (25 f). The typical form is light cream-colour, yellowish white, with sharply marked, dark, distally usually distinctly dentate band on the forewing; the brown band rather broader, sometimes indistinct or even absent. On the forewing there is frequently a short brown subbasal band. Underside likewise pale, with broader dark bands. The figure (25 f) represents a dark form in which only the outer area of the forewing has the normal creamy colour. Palestine.

josua. **L. josua** *Stgr.* (26 a). The specimen here figured doubtless belongs to this species, but the colour of its forewing is very light. In true *josua* the forewing of the ♂ is brown densely dusted with yellow bearing a light basal spot, which is usually produced into 2 sharp points; the light border of the median band is distinct and continued on to the hindwing as a narrow prominent transverse band. In the ♀ the forewing is even more densely dusted with light scales than in the ♂ and the hindwing also is frequently paler. Palestine. Early stages *vaucheri.* not known. — The species is represented in Morocco by a larger and darker race, **vaucheri** *Blach.*; the ♂ is dark reddish brown irrorated with small yellow scales, all the markings, i. e. the basal and discal spots and the transverse bands, are prominent and nearly ochreous; the ♀ is lighter in colour and more variable, the light markings being somewhat diffuse.

d. decolorata-group.

decolorata. **L. decolorata** *Klug* (26 a) is nearly uniformly pale yellowish grey, without pale discal spot. Palestine and Egypt.

grisea. **L. grisea** *spec. nov.* (26 a). An entirely unicolorous species, which is light-grey with an ill-defined white discal spot in the forewing. The ground-colour is similar to that of *palaestinensis Stgr.*, but there is no trace whatever of dark markings. Palestine.

datini. **L. datini** *Mab.* (26 b) is uniformly dirty brownish grey. Tunisia.

staudingeri. **L. staudingeri** *Baker* (26 b). Yellowish brown or more greyish brown. ♀ with remnants of wings, dark greyish brown or reddish brown. Algeria (Lambessa, Biskra). Larva similar to that of *serrula*, frons with a triangular sulphur-yellow spot, which is separated by a deep black border from the slaty blue sides of the head. Characteristic are subdorsal, horizontal, pointed pencils of hair of which there are 5 on each side of every segment, the pencils converging at their tips. The intersegmental incisions slaty blue marked with white. In June full-grown on low plants of various kinds, such as species of Artemisia, Genista, Trifolium, and also on young bushes of Quercus ilex. According to Dr. Seitz's observation the larva remains in daytime on the ground or more inside the bunches of the food-plant, appears at 5 o'clock p. m. and can be obtained in numbers shortly before dusk sets in. It is difficult to breed, and pupates on the underside of stones, for which reason it is advisable to place some stones into the cage. As the larva does not easily take to a new kind of food, it is best to feed it up on the species of plant on which it was found. As a rule it eats but little and grows slowly, and a large percentage die in captivity. Pupation in a cocoon which is similar to that of *trifolii*, but sometimes entirely white. The moths are on the wing in August and September. In Central and Southern Algeria (Lambessa, Batna, Biskra), locally very common.

7. Genus: **Macrothylacia** *Ramb.*

Closely allied to *Lasiocampa Schrank*. Eyes evenly hairy. End-segment of palpi shorter than in *Lasiocampa* and indistinctly separated. Veins 6 and 7 of hindwing always on a distinct stalk, basal cellule smaller and just reaching the middle of the cell, sending off two strong, simple or furcate, accessory veins to the costal margin. Antennae of ♂ with long pectinations, of ♀ with very short teeth. Frons and anterior tibia unarmed, as in *Lasiocampa quercus*. Wings as in *Lasiocampa*, broad, rounded, entire; forewing with 2 light transverse bands. Represented in the Palearctic Region only by one species, which however is widely distributed.

rubi. **M. rubi** *L.* (26 c). ♂ paler or darker brown, varying from rather light rust-brown to deep red-brown; forewing with 2 whitish discal bands which converge behind, are either narrow, sharply marked and linear, or broader and more diffuse, and either stand rather far apart or approach each other strongly or even touch one another. On the distal half a submarginal, broader or narrower, often indistinct or even absent, greyish white suffusion which is well defined and strongly dentate only on the outer side. Fringes whitish. Underside entirely unicolorous, or at the most the outer band vestigial. ♀ larger, greyish brown, forewing strongly suffused with greyish white; markings as in the ♂. Throughout Europe (with the exception of Sicily and Greece) as far as Central Asia. — The variability is considerable in both sexes in size as well as colour and markings. The ♂ of name-typical **rubi** *L.* (26 c) is dark reddish brown, the ♀ greyish brown with a slight reddish tone, the whitish transverse bands are rather far apart. The different colour-varieties of ♂ and

Tutt with a special name, likewise the combinations of markings repeated in each of these groups, which are, however, as in *Las. quercus*, only of individual importance. Accordingly we distinguish: — ♂-forms: with bright foxy red colouring and typical markings, ab. **rufa** *Tutt*, having the following aberrations in markings: transverse *rufa.* bands of the forewing widely divergent (*rufa-separata Tutt*), close together (*rufa-approximata Tutt*), touching in the centre (*rufa-conjuncta Tutt*), or confluent forming a wide median band (*rufa-fasciata Tutt*), one transverse band absent (*rufa-unilinea Tutt*), or the bands asymmetrically developed in the two wings (*rufa-dissimilis Tutt*), or the wings with indistinct transverse bands (*rufa-obsoleta Tutt*), and lastly with the spaces between the transverse bands filled in with dark (*rufa-virgata Tutt*). — With dark rust-red ground-colour and typical markings, ab. **ferruginea** *Tutt*, with the same aberrations in markings as above (*ferruginea-separata*, *ferruginea.* *ferruginea-approximata*, *ferruginea-conjuncta*, *ferruginea-fasciata*, *ferruginea-unilinea*, *ferruginea-obsoleta*, *ferruginea-dissimilis* and *ferruginea-virgata*). — Ground-colour light like the lighter submarginal colour, ab. **pallida** *pallida.* *Tutt*, with the same forms as above (*pallida-separata*, *pallida-approximata*, *pallida-conjuncta*, *pallida-fasciata*, *pallida-unilinea*, *pallida-dissimilis*, *pallida-obsoleta* and *pallida-virgata*). — ♀-forms: Ground-colour greyish brown tinged with reddish, the typical form, in which there are the same aberrations as in the ♂ (*cervina-separata cervina-approximata*, *cervina-conjuncta*, *cervina-fasciata*, *cervina-obsoleta*, *cervina-dissimilis* and *cervina-virgata*): ground-colour dull greyish brown without reddish tinge, ab. **grisea**, with the same forms (*grisea-separata*, *grisea-* *grisea.* *approximata*, *grisea-conjuncta*, *grisea-fasciata*, *grisea-unilinea*, *grisea-dissimilis*, *grisea-obsoleta*, *and grisea-virgata*, all these names by Tutt). — In Morocco and Spain two well-characterised southern forms occur. **digramma** *digramma.* *Meade-Waldo*, of which only the ♀ is known, deep dark reddish brown with sharply defined, narrow and widely separate bands on the forewing. Fringes darker. Morocco. Larva on Quercus ilex and Pistacia lentiscus, from December to March, moth in April. — **korbi** *Grünberg*, from Spain (Sierra Espuna), is uniformly *korbi.* dark reddish brown in both sexes, without any markings. — A rather doubtful form is that occurring in Finland and at the most northern border of the distribution-area, **pygmaea** *Reuter*, a small dark form with the *pygmaea.* transverse bands close together and indistinct, but sharply edged with black on the outer side. — Moths in June and July. The ♂♂ are on the wing towards evening at dusk, looking for the ♀♀, their flight being irregular and rapid; the ♀♀ occasionally come to the lamp. The eggs are elliptical, flattened, grey with glossy surface, and are deposited in cylindrical clusters on stalks of grass and low-growing plants, sometimes also on stones. The larva is black with dense long hairs of the same colour intermixed with white laterally, while dorsally it bears short, felty, lighter or darker brown hair. Incisions deep black. Posterior edges of the segments with a brownish yellow transverse band interrupted in the centre, becoming indistinct in the full-grown larva. The larvae are polyphagous, living until the middle of October on different grasses and low-growing plants, also on some deciduous shrubs, such as birch and blackberry. At the slightest touch they roll up and drop to the ground. In the autumn, when they are full-grown, one often sees them wandering about restlessly in large numbers on meadows and moors. They hibernate, also rolled up in a ring, under roots of plants, moss, etc., until the end of February, and then live in the open again until they pupate in April, but without feeding. They are much decimated by parasitical insects, and a large percentage is also destroyed by a parasitical fungus during the winter, so that they are always much rarer in the spring than in the autumn*). Pupa black, with short stiff bristly hairs and light-brown abdominal incisions, more slender and thick-skinned than in Lasiocampa, in a soft blackish grey and rather dense cocoon.

8. Genus: **Metanastria** *Hbn.* (= Amuria *Auriv.*).

Antennae of ♂ with moderately long pectinations, of ♀ with short ones. Palpi long, porrect, with long erect hair, and very long cylindrical end-segment. Eyes naked. Frons smooth. Wing entire, forewing broad with sharp rectangular apex, costal margin strongly curved, outer margin slightly so, inner margin almost straight: hindwing large and broad with broad rounded apex, costal margin almost straight, distal margin strongly curved. Forewing with 12 veins, 2 to 4 at fairly regular distances from the cell, 5 from the hind angle of the cell distinctly separate from 4, 6 and 7 on a short stalk from the upper angle, 8 from the short stalk of 9 and 10; 2 to 8 into the distal margin, 9 into the apex: in the hindwing vein 2 from the middle of the cell, 3 to 5 at equal distances from and near the lower angle of the cell, 8 rather far beyond the origin of 7 united with it for a very short distance, basal cell moderately large but very elongate, accessory veins absent. Cell of both wings closed. Cross-vein curved in the forewing., acutely angled in the hindwing, the anterior straight portion only half as long as the posterior curved one; a receding vein runs basad from the angle. Thorax rough-haired, abdomen more smooth. Legs moderately long, femora and tibiae with very long hair, tarsi smoothly scaled, first segment considerably shorter than the others together. Fore tibiae not armed, middle and hind tibiae with very short end-spurs concealed in the long hair.

M. subpurpurea *Butl.* (= dieckmanni *Graes.*, rubra *Hamps.*) (26 c). Antennae light brown; frons, *subpurpurea.* tegulae and dorsum of thorax yellow, patagia, sides of thorax, and abdomen dark brown. Forewing chestnut, dusted with grey scales and bearing two narrow yellow, slightly wavy, transverse bands before and beyond the centre, which begin with a larger spot at the costal margin. Black discal spot very indistinct. Inner margin

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*) Numerous observations have already been published about the hibernation of the larvae in captivity. It seems to be very important that in the autumn and early winter enough water is poured on to the moss in which the larvae are embedded.

densely covered with long yellow hair from the base to the light spot terminating the outer band. Hindwing lighter brown. Underside reddish brown, both wings with greyish yellow transverse band, only reaching to vein 4 in the forewing. At the basal side of the transverse band both wings densely covered with grey scales. ♀ like the ♂, only slightly lighter and more thinly scaled. Amurland, Japan. On the wing in July. Eggs reddish yellow. Larva cylindrical, thinner at both ends, without long lateral hairs, head small, dull black, body clothed with yellow hair, dark grey with a row of velvety black dorsal spots divided on segments 4 to 10 and bounded laterally by a light sickle-shaped mark. Underside reddish yellow. Gregariously in a whitish grey web, only feeds at night, hibernates and then feeds up until June or July. Cocoon very hard, parchment-like. Sometimes two to four pupae in one cocoon, the pupa hibernating again. In Southern Amurland (Vladivostock), however, the insect only hibernates once.

9. Genus: **Diplura** *Ramb.*

A well-characterised genus confined to the western Mediterranean area and only containing two very closely allied species. Antennae of ♂ with long pectinations, in the ♀ only serrate. Palpi small, slightly pendant, indistinctly jointed. Eyes hairy. Hair of the body of ♂ long, of the ♀ shorter; abdomen of ♂ with a divided bifid long anal tuft. Wings entire; forewing triangular, with sharp apex; costal margin only slightly curved in the outer half, distal and inner margins moderately curved: hind angle broadly rounded. Costal margin of hindwing strongly excurved at the base, distal margin rather strongly curved. Forewing with 12 veins, 2 to 4 at almost equal distances from the hind margin of the cell, 5 from the hind angle of the cell, distinctly separate from 4, 6 and 7 from the upper angle of the cell, 8 close before it, 9 and 10 on a short stalks; 2 to 8 into the margin, 9 into the apex. In the hindwing 3 to 5 close together from the hind part of the apex of the cell, or 4 and 5 on a short stalk, 7 beyond the centre or close to the cell-apex, united close beyond the base by a strong transverse vein with vein 8, which latter is strongly curved towards the costal margin already at the base, so that a very large basal cell is formed, which is almost larger than the true cell. A moderately large accessory vein emanates from the base of vein 8. Cell closed in both wings; cross-vein of forewing irregularly curved, and in the hindwing angulate before the centre. Femora and tibiae with long but rather sparse hair, tarsi smoothly scaled, fore tibiae not armed, middle and hind tibiae with two short end-spurs. The species are uniformly red-brown or greyish brown, with sharp white discal spot and outer white dentate line on the forewing. — Larva long, cylindrical, with irregular hair, long at the sides, and producing strong inflammation. Only two warts of different size at each side of the first segment; segments 2 to 5 dorsally with two transverse short and very dense tufts of hair beyond the middle, on segments 2 and 3 another pair of such tufts at the anterior edge; segments 6 to 12 without these tufts and in the middle only sparsely hairy. Yellowish bristles on all segments at the anterior and posterior margins; segments 6 to 10 in addition with two or three felty spots covered with white hair. Pupa short and stumpy, naked, reddish brown, in an elliptical parchment-like cocoon.

loti. **D. loti** *O.* (26 d). ♂ dark reddish brown, forewing with sharply defined white discal spot, and white, slightly wavy, postdiscal band, which is broader at the inner margin. Underside like upper, band more indistinct. ♀ slightly larger, dark greyish brown, discal spot sharply defined, band indistinct; underside almost or entirely without markings. West and Southern France, Spain. Flies in May and June. Larva greyish brown with white lateral hairs, the bristles on the anterior and posterior edges yellow. Head brown, hairy. According to Mendes from the end of August to May, and according to Rouast from May to August, on Cistus salviaefolius. As regards pupa cf. description of genus.

algeriensis. **D. algeriensis** *Baker* (= brunnea *Oberth.*) (26 d). Also regarded as a form of *loti*; similar to the preceding, band of the forewing of the ♂ strongly and sharply dentate. ♀ dark brown, with ill-defined discal spot, without band. End of July and August, not rare on stony slopes; according to other statements specimens also occur in April (from hibernating pupae ?).

10. Genus: **Nadasia** *Walk.*

Very closely allied to *Diplura*, containing two small species only known from Egypt. Antennae of ♂ with long pectinations, of ♀ with shorter ones, which are however distinct to the tip. Apex of forewing more rounded than in *Diplura*, inner margin straight, costal margin of hindwing considerably longer than the inner margin. Vein 6 and 7 as well as 9 and 10 on a long stalk in the forewing, stalk almost as long as the free ends of the veins; 9 into the margin, 10 into the apex. Two accessory veins at the base of the hindwing. First tarsal segment with a few long hairs on the outer side. Colour uniformly dirty greyish brown; forewing with minute white discal spot and various light and dark wavy lines, or almost without markings. — Larva and pupa of *N. obsoleta* have been described by Klug.

undata. **N. undata** *Klug* (26 d). Body greyish brown with a reddish tinge, forewing of the ♂ of the same colour, discal area darker, bounded proximally and distally by a whitish dentate line. A blackish, finely dentate, band before the margin. Fringes with light spots. Hindwing lighter grey, with ill-defined dark submarginal band

Underside lighter than upper also on the forewing; markings indistinct. Hindwing with dark discal band. ♀ larger, lighter grey, markings indistinct and diffuse. Egypt, early stages unknown.

obsoleta. **N. obsoleta** *Klug* (26 d). Uniformly brownish grey, forewing with indistinct dark discal and submarginal bands. Egypt. — Egg pale yellowish, deposited on slender twigs of Acacia. Larva blue-grey, underside yellow with black spots, sides with fine sporadical black dusting and long grey hairs. Back with yellow longitudinal band dotted with black, and irregular black lateral band bounded by a black stripe of spots on the outer side. First and last segments blackish blue, 2, 10 and 11 with long black dorsal tufts of hair, 3 to 6 with short brown brush-like hairs, 7 to 9 each with two black warts. Pupa dark brown, stumpy, in a regular elliptical greyish white cocoon, attached to slender twigs at the top of Acacia-trees.

11. Genus: **Chilena** *Walk.*

Of this genus, which is essentially Oriental and Ethiopian, only three species are Palearctic, occurring in the East-Mediterranean district. Antennae with long pectinations, which are only slightly shorter in the ♀ than in the ♂. Palpi short with rather long bristles, end-segment small, knob-like. Eyes densely hairy; frons smooth. Body very hairy, abdomen of ♂ pointed, with longer anal hairs and lateral tufts on the middle segments. Forewing and the rather long fringes entire. Forewing broad with rounded apex, costal margin slightly curved only in the outer half, distal margin also moderately curved, inner margin almost straight. Costal margin of hindwing slightly excurved at the base, then straight, distal margin strongly curved. Veins 6 and 7 of the forewing on a short stalk from the upper angle of the cell, 8 close before it, free, 9 and 10 stalked, stalk shorter than the free ends of the veins, 2 to 9 into the distal margin; in the hindwing 4 and 5 on a short stalk, 8 free from the base, soon after its origin united with 7 for a short distance, forming a small basal cell with it; two strong accessory veins; 1 b to 7 into the distal margin, 8 into the costal margin. Cell closed in both wings; cross-vein of forewing very slender, angulate near the lower angle of cell and then strongly inclining towards the apex of the wing. Femora, tibiae and first segment of fore tarsi with long hair, tarsi smoothly scaled, with long segments, middle and hind tibiae with short end-spurs. The species are uniformly grey or greyish brown, with white discal spot and dark oblique transverse bands in the forewing. — Larva cylindrical, with soft hair, especially laterally, without lateral warts, the dorsal warts also feebly developed but bearing a few longer bristles. Segments 2 and 3 with four dorsal short dense tufts of hair each, 11 rather strongly raised with a few longer hairs, 5 to 10 with three ventrolateral transverse stripes of smooth silky hair. Pupa brown, naked, with stumpy, rounded, non-armed end, thin skinned, in a strong parchment-like white cocoon.

obliquata. **C. obliquata** *Klug* (26 e). Greyish white, forewing suffused with brownish, with an ill-defined brownish transverse band from the apex to the middle of the inner margin. Egypt.

sordida. **C. sordida** Ersch. (26 e). Antennae brownish yellow, body grey, wings lighter or darker greyish brown; forewing with white discal spot and two parallel ill-defined blackish brown transverse bands, the inner one running from the apex to the middle of inner margin. Underside almost without markings, and without discal spot. Central Asia. Very variable. — Larva bluish grey; segment 1 with two black spots, 2 and 3 almost black with yellow hind margin; the other segments bearing yellow dorsal and lateral lines with reddish yellow markings, and blue dots between them. On Alhagi camelorum, first brood in April, the second already in June. As the time of development is so short, perhaps a third brood also occurs. Pupates on the food-plant or on some undergrowth near by.

proxima. **C. proxima** *Stgr.* (26 e). Most closely allied to *sordida*, antennae dark brown, ground-colour of ♂ dark brownish grey, of ♀ lighter. Discal spot of forewing sometimes indistinct, the inner dark transverse line in immediate proximity to the discal spot, the outer one strongly dentate. Mesopotamia.

12. Genus: **Cosmotriche** *Hbn.*

Medium-sized species, from bright yellow to reddish brown in colour, in the forewing with an usually large white double discal spot and dark oblique band running from the apex of the wing to the inner margin. Antennae of ♂ with very long pectinations, in the ♀ with short ones. Palpi strongly porrect, with long cylindrical end-segment. Eyes slightly hairy, the hairs sometimes (*laeta*) very sparse. Frons slightly convex, smooth. Body densely hairy. Forewing elongate, but rather broad, costal margin curved only in the outer half, apex sharply marked, rectangular, outer margin moderately curved, inner also curved or almost straight, hindwing broadly rounded with strongly curved distal margin. In both wings the distal margin is more or less distinctly wavy. Forewing with 12 veins, vein 2 near the base, 5 from the lower angle of the cell, 6 and 7 as well as 9 and 10 on a short stalk, 8 free from the upper angle of the cell; 2 to 8 into the margin, 9 into the apex; in the hindwing 4 and 5 from a point or on a short stalk (*laeta*), 8 strongly curved at the base and united with 7 by a long oblique transverse vein beyond the middle of the cell, a large broad basal cell being formed; from this basal cell four or five accessory veins radiate, the outer longer one running parallel with the free end of vein 8. Cell closed in both wings, cross-vein angulate in the middle in the forewing, before the middle in the hindwing. Femora and tibiae covered with dense long hair, likewise the fore tarsi on the outer side; middle and hind tibiae with long end-spurs. Throughout the Palearctic Region with the exception of the Balkan Peninsula and North Africa, also in the Oriental Region. — Larva clothed everywhere with long thin hairs, on segments 2 and 11 a long dorsal brush of hair, on segments 3 or 4 to 10 dorsally three or four or even five parallel, or posteriorly divergent, tufts or brushes of short dark bristles. Laterally above the stigmata of segments 2 to 10 a longitudinal row of white spots or streaks of hair, three on each segment. Pupa in a long yellow cocoon pointed at each end, dark brown, glossy, with a large number of small thin bristles at the stumpy posterior end. The sexes are rather strongly dimorphic, the ♂♂ are smaller and darker than the ♀♀, the forewing appearing slightly shorter through the distal margin being more strongly convex and distinctly incurved at the apex. Dark ♀♀ and light ♂♂, however, also occur, and this reversion in colour characterises some local races.

C. potatoria. Drinker. Varying from dark reddish brown with lighter brownish yellow patches to light ochreous or greyish yellow. Forewing with dark-centred white discal spot, above which there is a small white dot, with narrow dark subbasal band, and a dark transverse band extending from the apex of the wing to before the middle of the inner margin. In the marginal area an often indistinct dark dentate band which bounds the lighter-coloured middle of the wing on the outer side. Hindwing with indistinct dark oblique band, which may be entirely absent. ♀ pale ochreous to light greyish brown, markings as in the ♂. Distributed from Japan over Siberia, Russia, Central and Northern Europe to Southern Italy and Spain; in the North to Finland. — Eggs short oval, slightly impressed on both sides, greyish white or with a reddish tinge, and strongly opalescent, deposited singly or in clusters on grasses and shrubs (Corylus, Rubus, Clematis, etc.), covered with a sticky substance by which they adhere to the objects and to one another. Larva blackish grey with a slight tinge of blue, dorsally with extended irregular yellow spots, which form stripes in very dark specimens; hairs of body and head light brown. Dorsal tufts and brushes of hair black. The lateral hairy spots white. In young larvae the dorsal markings are bright orange-yellow. The larvae emerge in August and first devour part of the egg-shell, afterwards feeding on hard grasses (Carex, Dactylis, Luzula), also on Leontodon. They hibernate after the third change of skin from the end of October or November until April, and are ready to pupate in June. The fusiform cocoon is pale yellow, being often attached to the stalks of Sparganium and Phragmites; pupa glossy dark brown or blackish brown. The larvae require a great quantity of moisture and drink large drops of water. Therefore in breeding them the food must be well sprinkled with water. After a long drought it happens that they attack other larvae and suck them out. The moths appear from the end of July until the end of August and fly in the late evening, the ♂♂ being agile, the ♀♀ rather clumsy, the latter also *potatoria.* sometimes coming to the lamp. — True **potatoria** *L.* (26 f) is reddish brown in the ♂, with more or less extended lighter spots, and light ochreous or pale loam-yellow in the ♀, with the characteristic markings in both sexes. *askoldensis.* — In Southern Amurland (Ussuri) a special form occurs, **askoldensis** *Oberth.* (26 f); larger and darker than the European specimens. It appears to be confined to the Ussuri district, for specimens from Chabarovsk and Nicolaievsk, for instance, do not differ from the European form; however, small specimens similar to the type-form are found also in the Ussuri district. — The typically coloured form with indistinct transverse bands *berolinensis.* Tutt names *obsoleta-potatoria.* ab. **berolinensis** *Heyne* (26 f): ♂ pale yellow, the darker parts greyish yellow, this colour sometimes spreading over the entire wing; ♀ still lighter than the typical form, underside whitish yellow; surroundings of Berlin, also in England. Tutt names a uniformly pale grey or whitish yellow form without distinct bands, *obsoleta-berolinensis.* Here must also be placed the form occurring in Northern Europe, Denmark and Northern Germany, with conspicuously light-coloured ♂ and dark ♀, which Caradja *inversa.* has named ab. **inversa.** A very light yellow ♂-form with quite indefinite markings and almost obsolete discal *feminalis.* spot on the forewing we name ♂-ab. **feminalis**; the band of the hindwing is conspicuously broad and diffuse. Fig. 26 g 1 and 2 represent a form from Holland (Amsterdam), ochreous in both sexes with the markings also ill-defined (especially in the ♀), and with the veins, particularly in the forewing, conspicuously blackened. *atrinerva.* We name it **atrinerva** ab. nov. — Tutt (Brit. Lep. vol. III) treats all the other shades of colouring as separate *lutescens.* varieties: the dark yellow or orange-yellow form with normal markings is named **lutescens** *Tutt* (with indistinct markings *obsoleta-lutescens Tutt*); the dark yellow form with reddish or yellowish brown base of the forewing, *proxima.* transverse bands and hindwing of the same colour, the hindwing having a darker band, is **proxima** *Tutt*; *intermedia.* **intermedia** *Tutt* is very little different, the reddish brown darker colour occupying the marginal area beyond the outer transverse band as well as the costal marginal area; the hindwing is uniformly reddish brown with considerably *diminuta.* darker median band. ab. **diminuta** *Tutt* is reddish brown to chocolate, forewing with yellowish basal inner marginal spot and a yellowish streak from the lower discal spot to the outer transverse line, hindwing *extrema.* uniformly reddish brown. Lastly the darkest form, ab. **extrema** *Tutt*, has the forewing uniformly dark reddish brown or chocolate, with slight purple tinge and the transverse bands still darker, hindwing uniformly dark reddish brown (with indistinct transverse lines: *obsoleta-extrema*).

albomaculata. **C. albomaculata** *Brem.* (26 g). Closely allied to *potatoria*, somewhat smaller, the two white spots of the forewing considerably larger, especially in the ♀. The ♂ dark reddish brown to quite deep dark brown with a decided violet tinge, ♀ also brown with a brownish violet forewing. Between the oblique transverse band of the forewing and the submarginal dentate band the colour is slightly lighter, in the ♂ usually whitish violet. The dark transverse band of the forewing is always absent. Southern Amurland, Corea and Japan. In Amurland in June and July. — Larva with large orange-brown dorsal spots edged with white, and four tufts of hair at each side on segments 4 to 10 respectively, these being still shorter than in *potatoria*; laterally and ventrally brownish. Habits as in *potatoria*, likewise the shape and colour of the cocoon.

laeta. *sulphurea.*

C. laeta *Walk.* (26 g). A very beautiful brightly coloured species (the figure is rather too dark). Base and costal marginal area of the forewing warm yellowish brown, inner margin lighter ochreous, the marginal area lying beyond this blackish transverse band reddish violet, the forewing of the same colour, but more light brownish towards the base than the abdomen. Discal spot of forewing very large and irregularly angulate, touching the small spot, with a dull silvery gloss. Distributed from Eastern Siberia, Corea and Japan to Anterior India and the Sunda Islands. The specimens from India and the Sunda Islands are more unicolorous, and above all do not possess the large deep yellow inner marginal spot of the forewing which characterises the East Asiatic ab. **sulphurea** *Auriv.*, occurring as far as North India. — Larva common in Amurland on Laspedeza bicolor, in shape and colour similar to that of *potatoria*, grey, laterally intermixed with yellow and blackish, with broad black dorsal band formed of connected rhomboidal spots. On segment 2 a slightly longer and thinner tuft of hair beyond a black one; the tuft on segment 11 mixed black and white. Short black tufts of bristles on segments 3 to 10. The eggs are glued to the small stalks of the food-plant and hibernate. The young larvae do not appear until the beginning of June, in small clusters of from 10 to 20 specimens, and are full-grown the middle of July. Cocoon yellowish white, somewhat lighter and slenderer than in *potatoria*. Moth the beginning of August.

13. Genus: **Selenephera** *Ramb.*

Antennae scarcely half as long as the forewing, in the ♂ with fairly long pectinations, in the ♀ serrate at the base, then pectinate. Palpi scarcely extending beyond the forehead, with bristly hairs and with stumpy knob-like end-segment. Eyes hairy. Body with long dense hair. Margin of both wings slightly wavy. Forewing triangular with rather sharp rectangular apex, costal margin only slightly curved in the outer half, distal and inner margins moderately curved. Hindwing strongly rounded, with strongly curved distal margin, and the costal margin excurved at the base. Venation similar to that of *Cosmotriche*, 6 and 7 as well as 9 and 10 of the forewing on longer stalks, basal cell of hindwing also large and broad, but without accessory vein, only from the base of the hindwing an accessory vein to the costal margin. Femora and tibiae also long-haired, tarsi without hair, smoothly scaled. Hindtibiae with short end-spurs usually concealed in the hair. Only one species. — Egg large, elliptical, bluish green with a dark median spot at each end. Larva with thin hair like that of *Cosmotriche*, with long tuft of hair on segments 2 and 11, segments 3 to 10 respectively with three tufts of short black bristles close together on each side, the anterior ones very small, the last four large and broad, on segments 11 and 12 two small similar tufts. Ventro-lateral white hairy spots as in *Cosmotriche*. Lateral warts absent. Pupa naked, with stumpy anal end, without hooked bristles, in a long-elliptical soft cocoon, intermixed with the hairs of the larva.

lunigera. *lobulina.* *intermedia.*

S. lunigera *Esp.* (= lobulina *Frr.*) (27 a). Forewing ashy grey, with large halfmoon-shaped white discal spots, median area bounded by two black transverse bands, edged with white on the proximal respectively outer side, the outer band especially strongly dentate. In the marginal area a black submarginal dentate line. Hindwing dark greyish brown with ill-defined whitish oblique band. Fringes of both wings white, with black spots at the ends of the veins. From Lapland over Sweden, Russia, Central and South Germany, Bohemia, the Alpine countries to Roumania. ab. **lobulina** *Esp.* (= lunigera *Frr.*) (27 a), the dark form, is entirely black without markings except for the lunule and perhaps the light edges to the transverse bands of the forewing. Between these two forms stands **intermedia** *Rbl.*, in which only the median area of the forewing is blackened. Larva bluish black, with irregular yellow dorsal spots, or bluish grey with red spots (*lobulina*), dorsal hair black, ventral hair whitish grey, all tufts black; dorsally on the anterior and posterior margin of segment 2, at the extreme anterior margin of 3 and between the tufts of hair on 3 to 11 there are also white hairs. The dorsal patches on which stand the tufts of bristles are bounded by bright light yellow spots. On firs, more rarely on pines, hibernates when young on a branch (only exceptionally full-grown already in the autumn), in the following year until June. Cocoon dirty grey, pupa yellowish grey. Moth in July and August.

14. Genus: **Trabala** *Walk.*

An essentially tropical genus, distributed from Southern Asia over South-Eastern and Southern Africa to Central America. Antennae of both sexes with long pectinations, these only slightly shorter in the ♀ than in the ♂. Palpi short, densely and broadly hairy. Eyes naked. Body densely hairy. Abdomen of ♂ slender and pointed, of ♀ with broad thick anal tuft. Margin of both wings wavy, more so in the hindwing, forewing broad, triangular, apex rectangular, slightly rounded, costal margin only curved in the outer half, distal margin also only slightly curved, inner margin more strongly so. Hindwing very broad, rounded, anal angle of ♂ much produced backward, hindmargin as long as the abdomen. Forewing with 12 veins; vein 2 originating near the base, 3 halfway between 2 and the apex of the cell, 4 and 5 slightly separate or together from the lower angle of the cell, 6 and 7 on a short stalk from the upper angle of the cell, 8 close before it, free. 9 and 10 on a very long stalk, the stalk considerably longer than the free ends of the veins; 2 to 9 into the margin, 10 into the apex; in the hindwing vein 2 halfway between base and apex of the cell, 4 and 5 together from the lower angle of the cell. 7 close to the base from the cell, shortly united with 8 close to its origin, forming a short narrow basal cell. A short strong accessory vein directed costad originates at the base of 8. Cell of forewing closed, cross-vein very thin and almost rectangularly angulate in the middle, cell open in hindwing. Femora and tibiae densely clothed with long hair, tarsi densely scaled with a few hairs only on the outer side, middle and hind tibiae with short end-spurs.

vishnou. **T. vishnou** *Lef.* (= sulphurea *Koll.*, pallida *Walk.*) (27 a). Only the typical species of the genus occurs on Palearctic territory, being found throughout Southern Asia, Ceylon and the Sunda Islands, and going northward to Kashmir and China. ♂ light apple-green, sometimes with a yellowish tinge, antennae, costal margin of forewing and the common narrow transverse oblique band are light brownish, a submarginal dentate band, often quite obsolete, and the fringes darker brown; median area of forewing, inner marginal area of hindwing and upperside of abdomen whitish. ♀ much larger than the ♂, varying in colour between light yellowish green and a decided ochreous yellow, all markings sharper, dark brown to blackish. Forewing with a large sharp discal spot often having a grey or white centre, and an extended inner marginal spot usually reddish brown with darker edges. Several forms of the larva occur. The usual one is brownish grey with two black dorsal spots on each segment bearing long black hairs, these spots being united on the thoracical segments, and with long lateral tufts of hair, the anterior one intermixed with black hair. Head yellow spotted with red. A second form of the larva is blackish with broad white dorsal band and reddish brown anterior tufts of hair. A third form is reddish brown with blue lateral spots. The cocoon is covered with short black poison-hairs which urticate strongly. It is brownish yellow, is placed on a thin twig and has the shape of a camel's back on account of two humps.

15. Genus: **Epicnaptera** *Ramb.*

Antennae of ♂ with moderately long pectinations, of ♀ with only short ones, almost serrate at the base. Palpi covered with dense bristles, porrect, but only slightly extending beyond the frons. Body, especially the abdomen, densely clothed with woolly hair. Margin of both wings wavy, especially of hindwing. Forewing elongate with pointed apex; costal margin slightly curved, distal margin strongly so, a deep sinus between veins 2 and 3, inner margin produced into a lobe before vein 2, moderately incurved in the middle. Hindwing regularly rounded, distal and inner margins almost circular,but the basal part of the costal margin strongly ventricose and terminating abruptly, forming a sharp right angle. Vein 2 of forewing originating close to the base, 4 and 5 close together from the lower angle of the cell, 6 and 7 on a short stalk, 9 and 10 on a fairly long one, 8 close before the upper angle of the cell; 2 to 8 into the distal margin, 9 into the apex; in the hindwing 4 and 5 on a short stalk, 8 first curved towards the costal margin, then strongly recurved towards the cell, and here connected with the base of 7 by a short transverse vein; a broad basal cell is thus formed, from which 2 or 3 veins branch off towards the costal margin, another accessory vein originating from the base. Cell closed in both wings, cross-vein of forewing slightly curved, in the hindwing almost straight. Femora and tibiae clothed with long dense hair, middle and hind tibiae with moderately long end-spurs. — Larvae similar to those of *Gastropacha* (cf. below), with the hairs very short and sparse above, rather long and dense laterally, lateral warts simple, on segments 2 and 3 a brightly coloured entirely bare ornamental spot; segment 11 with a flat dome-shaped hump. Pupa with a grey or bluish to reddish bloom, with numerous short hooked bristles over the whole back of the thorax and at the anal end, and a similar belt of bristles on all the abdominal segments; in a soft mealy cocoon.

ilicifolia. **E. ilicifolia** *L.* (— betulifolia *Esp.*) (27 b). Light rust-colour to reddish brown, forewing with large grey discal spot and three rather indistinct transverse bands formed of black spots, the middle one continued on the hindwing. Distal margin of forewing light grey. Hindwing darker grey with diffuse white median band. The tips of the dark brown fringes white between the veins. Distributed from Japan and Eastern Asia (China, Eastern Siberia) to Scandinavia and Finland; in Europe to Northern Italy; absent from Holland. — The lighter-coloured Japanese form, in which there is also a greyish white postmedian band on the forewing, beside the *japonica.* large discal spot and marginal area of that colour, is **japonica** *Leech.* Larger and more brightly coloured specimens already occur in Amurland, which are perhaps identical with the Japanese form. — The Tibetan Alpine *sinina.* form **sinina** *Gr. Grsh.*, from Amdo, is only superficially described as a lighter and brighter red form. However, in European Alpine specimens the grey is also sometimes more extended. Tutt (Brit. Lep. vol. 3) has divided the British specimens into several forms according to the intensity of the markings and the gradation in the *virgata.* shade of colour. He distinguishes as ab. **virgata** *Tutt* a form with the dark median band sharply contrasting *rufescens.* with the transverse lines, and enclosing the light discal spot; as ab. **rufescens** *Tutt* a form with red ground-colour, grey or reddish green marginal area, small discal spot in the forewing and whitish transverse band in the hindwing; *rufescens* is really only distinguished from true *ilicifolia* by the much smaller white discal spot of the forewing. Almost uniformly red specimes with the markings strongly reduced are *unicolor-rufescens* *lutescens.* *pallida.* *grisea.*

Tutt. ab. **lutescens** *Tutt* is a form with yellow ground-colour; particularly pale-coloured specimens only showing slight traces of the red colour and the grey markings are ab. **pallida** *Tutt*; lastly, a predominantly dark grey form with the basal area of the wings reddish and the marginal area dark grey, the discal spot somewhat lighter and the transverse bands whitish grey, is ab. **grisea** *Tutt*; here, moreover, two subvarieties are distinguished, viz. *grisea-pallida Tutt*, a lighter grey form with small whitish discal spot and whitish bands on the forewing, and *grisea-suffusa Tutt*, a darker form with indistinct transverse bands, dark discal spot and reddish veins. — Moths in April—May. In daytime they rest quietly with the wings folded in roof-shape and the hindwings projecting below them, a position which renders them very similar to a dry leaf. In the evening they fly about rapidly. Egg oval, slightly flattened, with glossy white spots on a slightly darker ground-colour. Larva bright rust-brown with bluish grey head, hairs yellowish grey and black, the ornamental spots on segments 2 and 3 bright deep yellow, flanked by black spots; two sharp white dorsal spots before the hind margin of segments 2 to 11. A black dorsal line widened at each segment is very indistinct. Another form is grey with reddish yellow dorsal spots and black dorsal line. The very conspicuous ventro-lateral hairy spots white with a silky gloss. Underside deep black with light brownish yellow transverse band-like spots only in the incisions. Until August on willow and bilberry, especially on low shrubs near the ground, more rarely on poplars; in Amurland also on birch and Corylus mandschurica. Pupa blackish brown with reddish white bloom, in a yellow cocoon.

tremulifolia. *ambigua.*

E. tremulifolia *Hbn.* (= ilicifolia *Esp.*, betulifolia *O.*) (12 b). Closely allied to *ilicifolia*, the reddish brown or reddish ground-colour lighter and brighter; the grey discal spot of the forewing absent, the black bands are usually sharper and composed of smaller spots; the grey colour of the marginal area of the forewing less pure. Spots of fringes less distinct. Central Europe (absent in England), southward to Northern Italy, eastward to Southern Russia, Armenia and the Taurus. — Staudinger distinguishes a lighter form predominantly greyish yellow or grey and yellow, recalling *ilicifolia*: **ambigua** *Stgr.*, from Issykkul; it has also been found at Sarepta and in Hungary. — Egg reddish brown with broad white belt. Larva reddish grey, greyish brown or blue-grey, hairs light grey mixed with black on the warts, the ornamental spots on segments 2 and 3 bright vermilion, bounded laterally by large black spots and posteriorly by two small white ones. Underside and prolegs bright orange-yellow, predominantly black on the thorax, further back only spotted with black. Until the autumn on various deciduous trees, such as oak, birch, poplar, ash, mountain ash, also on fruit-trees; pupates in the autumn in a yellowish white cocoon. Pupa blackish brown with reddish bloom.

suberifolia.

E. suberifolia Dup. (27 c). Smaller than *ilicifolia* and *tremulifolia*, pale greyish yellow or with a slight reddish tinge. Transverse bands very narrow, often diffuse. Southern France, Spain and Portugal, North-West Africa, in two broods, February and June-July. In Portugal also observed in October (probably early specimens of the next spring brood). Larva bluish grey with white hair, the ornamental spots on segments 2 and 3 red, singly on oaks and cork-oaks.

glasunowi.

E. glasunowi *Gr.-Grsch.* A Persian species, not yet well known, resembling *suberifolia*. Forewing reddish brown with grey marginal area, the bands as usual formed of single lunules, the outer one broad, red, always accompanied by a yellowish grey shadow. Veins reddish yellow, fringes white. Hindwing darker, more intermixed with grey, with reddish grey median dentate band. Northern Persia; Teheran.

alice.

E. alice *John.* Head, thorax and legs mouse-grey or yellowish to reddish brown, abdomen mostly somewhat lighter. Wings with entire margin, lighter or darker mouse-grey to greyish or reddish brown, fringes white, darker brown at the ends of the veins. Forewing with dark brown discal spot, markings sharp and typical, as in *ilicifolia* and *tremulifolia*, the lunules of the transverse bands almost continuous. Transverse band of hindwing very pale and diffuse. Syr-Darja district. Moth in April and May, but probably already in March, single specimens also observed in July. The ♂♂ are on the wing directly after sunset, and then again just before sunrise, on dunes of steppes, their flight being rapid and rolling, and close above the grass, in which the as yet unknown ♀♀ are probably concealed.

arborea.

E. arborea *Blöcker* (27 b). The largest European species, related to *ilicifolia* and *tremulifolia*. Ground rust-colour to reddish brown or grey-brown, the grey discal spot of the forewing very large and distinct, the outer rather indistinct band of spots with a broad grey inner edge; marginal area also grey. The two median bands of blackish lunules sometimes more, sometimes less distinct. Hindwing with broad and almost straight median band, which is narrower towards the costal margin. As yet only observed in the Gouv. St. Petersburg, especially in the vicinity of the capital itself. The moth is rare and flies in the late spring when Rhamnus is in flower. — Eggs milky white, the dark brown markings similar to those of *ilicifolia* but larger; deposited in clusters of from 4 to 10 on the bark of trees. Larva on various deciduous trees, such as birch, poplar, oak, ash, also on high willow-bushes, appearing rather flattened on account of the strongly developed lateral warts and fleshy humps which bear long dense hair, and therefore like *tremulifolia* in shape, but more like *ilicifolia* in colour. Upperside very variable, dark bluish grey with yellow lateral longitudinal lines and small yellow and black spots between them, to almost uniformly grey; the white dorsal spots only vaguely indicated. Underside and legs velvety black, the yellow incisions only slightly developed. Cocoon dirty reddish grey, coarse, attached to trees, etc.

16. Genus: **Gastropacha** *O.*

Large and very conspicuous species. Antennae short and always strongly curved, with moderately long pectinations, these only slightly shorter in the ♀ than in the ♂. Palpi beak-shaped, stongly porrect and slightly curved, flattened laterally. Eyes short-haired, only sparsely so in the ♀. Body clothed with dense woolly hair. Wings with strongly dentate margin. Forewing elongate, costal margin strongly curved, apex slightly rounded, distal margin rather strongly curved, with a pointed tooth between veins 1 and 2; hindwing short oval, broadly rounded, costal margin strongly excurved. Veins 4 and 5 of forewing close together from the lower angle of the cell, 6 and 7 on a short stalk, 8 from the upper angle of the cell, 9 and 10 on a long stalk, the stalk longer than the free ends; 2 to 9 into the margin, 10 into the apex. In the hindwing vein 2 close before the apex of the cell, 4 and 5 on quite a short stalk, together with 3 from the lower angle of the cell, 6 and 7 close together from the upper angle; 8 strongly curved from the base, connected with the anterior margin of the cell by a long oblique transverse vein, sending off 5 or 6 long, strong, usually strongly curved, accessory veins to the costal margin. Cell of both wings closed. Femora and tibiae with dense long hair, middle and hind tibiae with quite short end-spurs hidden in the hair. In the whole Palearctic Region except the southern portion of the Mediterranean district, to Japan, China, and Anterior India. — Larva distinctly flattened dorsoventrally, with very strong leg-like lateral warts on segments 1 to 10, the three thoracical warts simple, long conical, the abdominal warts bifid, the anterior cone longer than the posterior, especially on segments 4 and 5. On segments 2 and 3 a raised transverse spot of a deep black colour densely covered with narrow lanceolate scales of the same tint. Segment 11 with a pointed conical or an obtuse hump. Short dorsal and long lateral hair; far down laterally between the legs 3 or 4 stripes of black hair on each segment. Pupa blackish brown to black, densely dusted with white, fairly densely setose, also setose at the rounded anal end, in a dense soft cocoon intermixed with the hairs of the larva and mealy dust.

quercifolia. **G. quercifolia** L. (27 d, e). The Lappet. Deep copper-red, wings darker towards the costal margin, with a whitish violet gloss in the marginal area; forewing strewn with yellow scales in the basal half, with three black transverse bands, the two outer ones formed of lunules. In the hindwing only two transverse bands. Distributed from Japan, China and Amurland to Europe, here common almost everywhere. In the South to Asia Minor, Turkey, Italy and Northern Spain (absent from Greece and Southern Italy), in Scandinavia to 60° latitude. The species varies considerably in the ground-colour, from quite dark to ochreous. — The *alnifolia.* darkest form is **alnifolia** *O.* (27 e), in which, especially in the ♀, the black colour may extend over the whole wing; it occurs from the Northern boundary of the area as far as Spain, the Alps and Hungary, but is particularly common in the North, where it is more abundant than the name-typical form. At the other end of *ulmifolia* the series stands **ulmifolia** *Heuäck.*, which is quite light, almost ochreous, but sharply marked. It is on the whole confined to the South, but occurs in Asia as far as the Amur. The aberration of this form without mark- *pallida.* ings Tutt names *ulmifolia-obsoleta*. — Very like the last-named is **pallida** *Spul.*, a pale yellowish reddish *dalmatina.* grey form almost without markings. — Forms also lighter but more reddish are **dalmatina** *Gerh.*, from Dalmatia, *meridionalis.* and **meridionalis** *Hormuz.*, found in the Mediterranean area to Asia Minor, in the former the outer band of lunules is absent and the inner median one only developed as a narrow line (according to Tutt this form is entirely without markings); in *meridionalis* the transverse bands are moderately well developed; Tutt here distinguishes two further forms, *meridionalis-obsoleta* entirely without markings, and *meridionalis-lineata* with sharply defined markings. In the same way he distinguishes *dalmatina typica* with the markings indistinct and *dalmatina-lineata* very sharply marked. Of course these forms are not always sharply defined. — Tutt enumerates *suffusa.* further two darker forms as aberrations, viz. **suffusa** and **purpurascens**, the former dark reddish brown, appear- *purpurascens.* ring greenish on the patches of the forewing which bear yellow scales, often with yellow fringes and sharp markings (with the markings indistinct or absent *suffusa-obsoleta*); and *purpurascens* is deep dark purple with the black extended and the transverse bands sharply defined (without markings *purpurascens-obsoleta*). — *cerridifolia.* **cerridifolia** *Fldr.* (27 e), from Japan, Corea, the Ussuri district and Corea, North China, is in contra-distinction to the preceding forms very well characterised; it is bright light reddish brown with a broad orange-yellow costal margin to the hindwing; the transverse bands are narrow and indistinct in the forewing and usually entirely absent in the hindwing. — Some further aberrations are also distinguished which differ from normal specimens in size or in the shape of the wings. Tutt names a giant-form, 100 to 120 mm. in expanse (♀), which *major.* was first mentioned by Gauckler and bred from particularly large larvae from near Vienna, ab. **major**. On *hoegei.* the other hand, ab. **hoegei** *Heuäck.*, a dwarf-form appearing as second brood in September in favourable years *salicifolia.* and sometimes also the result of breeding, is only half the normal size. — **salicifolia** *Stgr.*, from Kentei, is also considerably smaller than normal specimens, the ♂ measuring 51, the ♀ 60 mm in expanse; the colour is light greyish brown, similar to that of *populifolia*, especially in the marginal area, being almost violet-grey in the middle of the outer margin; the outer transverse line is only very slightly indicated. Hindwing with broad *sibirica.* transverse band, double in the ♀. — Lastly there is a form from Western Siberia (Tomsk), **sibirica** *Krul.*, which is also a light aberration of less than normal size, with indistinct bands on the forewing, almost unicolourous *incompleta.* hindwing, and yellow fringes. — Tutt names ab. **incompleta** a form bred by Gauckler which is obviously a monstrosity, having a semicircular excision at the anal angle of the hindwing. — Egg oval, flattened at both poles, with white ground-colour and green belt. They are deposited singly or in small groups of from four to six on the underside of leaves. Larva dark reddish brown or olive, often with extended irregular ashy grey spots, the transverse spots on segments 2 and 3 deep black, bounded by bright orange to brick-red lateral spots only in the young larvae. On segments 4 to 10 respectively four slightly raised rust-red wart-like spots, placed in pairs and bearing single lanceolate scales, the anterior pair smaller than the posterior one, and sometimes indistinct. Hump on segment 11 pointed, conical, and slightly inclining backwards. Hairs above mostly black, the long lateral hairs white to brownish yellow, lateral warts with single long black hairs. The ventro-lateral stripes of hair black. Base of anal claspers red or brown. Underside bright orange, with black spots, extendedly black on the thorax. The larvae emerge in August and live until the end of October on sloes and other species of Prunus, on fruit-trees, poplars, willows, hawthorn, wild roses; they hibernate on the foodplant, pressed closely against the bark, and at other times also lie so close along the twigs that they are difficult to find. They are sometimes very injurious to nurseries. Pupation in July, on branches, in a rather loose, dirty grey, long spindle-shaped cocoon. Pupa blackish brown, densely dusted with white. The moths appear in July, sometimes already in the second half of June, and can be found until August. In daytime they rest in the same position as the species of *Epicnaptera*, with the forewings folded in roof-shape and the hindwings projecting far forward, and are difficult to discover on account of their remarkable protective colouring, the effect of which is heightened by the leaf-like contour of the wings. After dark they are on the wing for several hours and also come to the light.

G. populifolia *Esp.* (27 c, d). Similar to the preceding, wings slenderer, light reddish brown-yellow, *populifolia.* apex and inner margin of forewing and costal margin of hindwing bright rust-yellow. Five black dentate lines formed of lunules on the forewing, and seven on the hindwing; forewing also with small black discal spot, and with a black longitudinal costal streak originating at the base. Distributed from Finland over the whole of Northern Central Europe to Northern Italy, Hungary, and the Bukovina, local and on the whole rare; absent in England; in the East as far as Northern China and Japan. — The species varies in the shades of colour like the preceding, but not so strongly. A very light whitish yellow form occurs (ab. **flava** *Schultz*), almost without *flava.* markings, which was observed in the neighborhood of Berlin; further, a pale greyish yellow form, very like the first named and perhaps not distinct from it, **fagifolia** *Roth* (Spuler). ab. **grisescens** *Spul.* is darker reddish *fagifolia.* grey-brown. — As in *quercifolia* a portion of the larvae of *populifolia* may in favourable years produce a second, *grisescens.* autumn, brood appearing at the beginning of September, which is named ab. **obscura** *Heuäck.* (= aestiva *Jaen.*) *obscura.* and is similarly characterised by the smaller size and darker colour. **autumnalis** *Jaen.* is an artificially forced *autumnalis.* third brood, obtained from the egg in a few weeks by means of an evenly high temperature: it is rather pale with well developed dark markings. ab. (cult.) **standfussi** *Jaen.* is also artificially produced, being scarcely *standfussi.* smaller than true *populifolia*, darker fiery red in colour with strongly developed black markings. — Eggs at first green with broad white belt, later on dark reddish brown, deposited on poplars in small clusters of five or six. Larva reddish grey to ashy grey, or white-grey, irrorated with fuscous, with lighter, more yellowish incisions, hairs black on the back, whitish grey at the sides, a few long black hairs only on the warts, the ventro-lateral spots of hair also black. Transverse spot on segment 2 black, on 3 lighter, with black edge. Hump on segment 11 dome-shaped, with two small warts on it. August until the autumn and from early spring until May, on various species of poplar, mostly on the higher branches, only going into the bushes in order to pupate. When being bred the larvae want a great deal of water, especially after the fourth change of skin. Pupa dark brown with light bristles and densely dusted with white, in a greyish white or more yellowish cocoon intermixed with the hair of the larva. The moth is much less common than *quercifolia*, in some districts even a great rarity.

G. tsingtauica *spec. nov.* (27 c, d). Most nearly allied to *populifolia*, but considerably smaller and *tsingtauica.* somewhat darker, with three distinct continuous bands on the hindwing; the lunules of the transverse bands of the forewing at the apex and before the inner margin broadened to form large black spots. China (Tsingtau) Types in coll. Bang-Haas).

16. Genus: **Estigena** *Moore.*

An essentially Oriental genus with only a few known species, one of which, *E. pardalis Walk.*, is distributed over the whole of Southern Asia and the Sunda Islands, and also occurs in Arabia. Very closely allied to *Gastropacha*. Antennae of both sexes with rather long pectinations, which are only slightly shorter in the ♀ than in the ♂, the branches becoming shorter towards the apex. Palpi long and broad, almost shovel-like in shape, porrect. Eyes naked. Forewing with entire margin, long and narrow, with acute apex, distal and inner margins rather evenly curved, hindwing almost regularly oval, strongly prolonged longitudinally also in the ♀. Veins 4 and 5 of forewing distinctly separate, 6 and 7 stalked, 8 out of the stalk, 9 and 10 on a very long stalk, the free ends considerably shorter than the stalk; 2 to 9 into the distal margin, 10 into the costal margin. In the hindwing vein 2 close to the apex of the cell, 4 and 5 stalked, the stalk together with 3 from the apex of the cell, 7 near the anterior angle of the cell, close to its origin united by a straight transverse vein with vein

8, which is curved from the base and emits six or seven strong accessory veins to the costal margin. Cell closed in both wings; basal cellule of hindwing large and broad, but shorter than the cell. Femora and tibiae densely hairy, middle and hind tibiae with very short end-spurs.

pardalis. **E. pardalis** *Walk.* (27 c). Reddish yellow to reddish grey-brown, but usually with the reddish tint distinctly predominant, often rendered much darker by loose black scales. Forewing with five blackish transverse bands, hindwing with two more or less distinct ones formed of separated lunules. At the costal margin of the hindwing and inner margin of the forewing a more or less bright yellow to rust-coloured, extended-light spot with a few black dots; in dark specimens it is often especially distinct. Touches the Palearctic Region in Arabia and the Western Himalayas, and is distributed in India far into the tropics, where it is not rare.

17. Genus: **Odonestis** *Germ.*

Antennae of ♂ with long pectinations, of ♀ with short ones, the branches longest at the base and becoming gradually shorter towards the apex, the posterior row longer than the anterior one. Palpi long and pointed, projecting far beyond the frons, densely scaled. Eyes hairy. Frons smooth, densely covered with long pendant hairs; thorax and abdomen densely long-haired, likewise the femora and tibiae, especially in the ♂. Middle and hind tibiae with rather long spurs. Forewing fairly broad, costal margin first straight, then rather strongly curved before the apex, distal margin entirely straight, very wavy or entire. Apex acutely pointed or slightly rounded. Anal angle obtuse, hind margin almost straight; hindwing broadly oval, distal and hind margins evenly rounded, costal margin rather straight, only slightly ventricose at the base. In the forewing vein 2 close to the base, 4 and 5 close together from the hind angle of the cell, 6 and 7 on a short stalk; 8 together with 6 and 7 from the anterior angle of the cell or close before it, 9 and 10 on a short stalk; 2 to 8 into the margin, 9 into the apex. In the hindwing vein 2 distant from the base, 3 from the hind angle of the cell, 4 and 5 also on a short stalk, 8 united with 7 for a short distance close beyond the base, forming a small narrow basal cellule, from which a strong accessory vein runs to the costal margin. Cell closed in both wings, discocellular vein of forewing convex, of hindwing straight, posteriorly directed obliquely outward. — The genus is distributed over the Palearctic and Indo-Malayan Regions, but in the Palearctic Region only represented by two species, one belonging especially to Europe, the other to Eastern Asia. They are bright red to reddish yellow in colour, the markings are confined to the forewing and consist of a large white discal spot, a subbasal and a discal dark curved line, as well as an irregular submarginal wavy line. — Larva similar to that of *Gastropacha*, rather flattened, with undivided leg-like lateral warts, most strongly developed on the thoracical segments, hairs dorsally short, laterally long and soft, often branched like a feather. Instead of the ventro-lateral tufts of hair there are numerous small tufts of hair arranged in round spots, which look almost like spots of mould. Segment 2 bearing a belt-like ornamental spot, not hairy, segment 11 with a broad round hump. Pupa densely clothed with short bristles on head, back, and the moderately pointed anal end, the abdomen bearing belts of such bristles. Pupa in a moderately dense cocoon.

pruni. **O. pruni** *L.* (27 f). ♂ orange-red or dark ochreous, hindwing somewhat paler. ♀ darker, brighter red, and larger. Forewing with large vividly white discal spot edged with black, and narrow, black, slightly curved, discal band, also narrower, irregular, subbasal and submarginal bands. Central Europe to Eastern Asia, absent in England, occurs in the South as far as Catalonia, Central Italy, the Balkan States and Asia Minor. The only *rosacea.* aberration of this very constant species which has as yet been named is ab. **rosacea** *Schultz*, an unusually light bright rose-red, normal-sized form, occasionally obtained by breeding, only the subbasal transverse *prunoides.* band is developed. — In Catalonia a second brood occurs, known as gen. aest. **prunoides** *Stgr.*, which is lighter than the type-form and only one-half or even one-third its size. — Eggs almost globular, chalky white, with grey central spot. Larva when young dark greyish brown, later on bluish grey with irregular black and reddish brown markings, the ornamental spot lighter or darker red, flanked by two black spots. Head dark greyish brown with sulphur-yellow transverse spot above at the hind margin. Hairs above dark, lateral hairs whitish. Underside orange-red with a row of large black median spots. Pupa black with brown hair, in a dirty whitish grey cocoon between leaves. Larvae from August until autumn and from the spring until June on fruit-trees and black-thorn, often in gardens, also on birches, Alnus and limes. They are difficult to breed and are best tied up in bags of gauze on their food-plant. Moth from June to the beginning of August.

brevivenis. **O. brevivenis** *Butl.* (27 f). Slightly smaller than *pruni*, with the margin of the forewing entire and straight. Bright light red, discal spot small, discal band also irregular with a strong curve outwards above vein 6; forewing of ♂ slightly darkened along the margin. Eastern Asia. Dr. Seitz, who often bred the species in China, gives the following information: Larva in shape resembling a half-grown larva of *quercifolia*, more brown than grey; laterally at the head two short tufts of hair directed forward; on the body lateral fringes of hair directed downwards. On segment 2 a black incision with two violet-blue tufts of hair, on segment 8 a saddle-like brown mark and on 11 a conical wart. On deciduous trees, especially on low bushes. Pupates in a paper-like white, rather mealy cocoon, the pupa being stumpy and blackish brown. From July to October; the moth common in Southern China in the autumn.

18. Genus: **Dendrolimus** *Germ.*

Large or at least medium-sized, densely hairy and opaque species, whose colouring is on the whole dull brown, reddish or greyish brown, light grey or at most reddish yellow. Antennae of ♂ rather strongly plumose, in the ♀ with short, or longer (*bufo*), pectinations. Palpi porrect, extending considerably beyond the frons and densely scaled and hairy. Frons smothly and densely hairy. Eyes hairy or naked. Thorax and abdomen densely hairy, the latter conical and pointed in the ♂, cylindrical in the ♀. Femora and tibiae very densely clothed with long woolly hair, tarsi smoothly scaled; middle and hind tibiae with long or short end-spurs. Forewing elongate, with slightly rounded apex, costal margin curved beyond the centre, distal margin moderately curved. Hindwing broad, evenly rounded, with the costal margin nearly or quite straight, distal margin of both wings slightly wavy or almost entire. In the forewing veins 4 and 5 together from the lower angle of the cell, 6 and 7 on a short stalk, 8 from the upper angle of the cell or close before it, 9 and 10 on a short or longer stalk; 2 to 8 into the margin, 9 into the apex or also into the margin (*bufo*). In the hindwing 4 and 5 on a short stalk from the lower angle of the cell, 8 anastomosed with 7 at a point close beyond the base, or connected with it by a very short transverse vein, a short narrow basal cell being formed, from which originate two short accessory veins, which may however be absent (*bufo*). Cell of both wings closed. Distributed throughout the Palearctic (from Europe to Eastern Asia) and Oriental Regions. — Larva somewhat flattened, clothed with long soft hair, the lateral warts distinct on the thoracical segments, but only slightly developed on the abdomen. Segments 2 and 3 above with a belt-like spot densely clothed with deeply coloured hairy scales; similar scales on a broad hump-like elevation on 11, as well as on two small dorsal warts on 10; the latter warts sometimes also bear long hairs (*bufo*). Smaller scales scattered on segments 2 and 3 on each side of the dorsal line, being especially dense beween the anterior transverse spots, where they cover the entire surface. Pupa clumsy, clothed with short hair, with broad rounded tail-end bearing numerous hooked bristles. — While the genus is, in Europe, only represented by *Dendr. pini*, quite a number of species have to be distinguished in Eastern Asia. The Japanese fauna alone contains seven species, some of which may however be found to be synonymous when they are better known. But four species are quite certainly known from the East-Asiatic continent, the most important of which, *Dendr. segregatus Btlr.*, closely allied to our *pini*, is distributed over the whole area including Japan. A second species, *undans Walk.*, is in its typical form confined to Southern Asia and only represented in Eastern Asia by some aberrant forms. Two other species, *remota Walk.* and *punctata Walk.*, are only known from China. The German colony Shantung knows from experience that the East-Asiatic *Dendrolimi* are no less injurious to forestry than the European one, whole freshly planted pine-woods having been destroyed. *Dendr. sibiricus Tschtr.*, from North-Western Asia, is a link between the East-Asiatic and European species, but seems only to occur on larches.

D. pini. A species varying greatly in ground-colour, from deep reddish brown to deep greyish brown and very pale yellowish grey. Forewing with small and usually prominent white discal spot, and three blackish transverse bands, continuous or formed of single curved and angulate spots, and sometimes entirely or almost obsolescent, the first band close to the discal spot, the second in the middle of the wing, the third submarginal, with a deep dentate sinus in the middle. The smaller ♂ is on the whole more sharply marked than the larger ♀. Hindwing unicolorous, without markings. Distributed in several forms in Europe from Scandinavia to Northern Spain, Central Italy and Greece (absent in England), in the East to Japan; in Amurland, China and Japan also occurs a series of forms hitherto usually regarded as distinct species. — The true European **pini** *L.* (28 a) is deep reddish brown or lighter brown to dark greyish brown, discal spot and bands of the forewing well developed, the costal margin, the space between the two inner bands and the distal marginal area scaled with grey; in specimens with the markings well defined the ground-colour beween the two outer bands therefore appears as a sharp brown transverse band, usually the base of the wing as far as the discal spot also retaining the ground-colour. All kinds of combinations, of course connected by various intermediate forms, result from the different shades of ground-colour, from the scaling between the two inner transverse bands being particularly densely whitish, from the inner bands or all bands being entirely or partly obsolescent. That so few forms of a species like this, whose colouring and markings are remarkably pliable, have as yet received names is owing to its absence from England, as otherwise Tutt, the well-known monographer of English Lepidoptera, would not have allowed such an admirable opportunity for erecting a large number of aberrational forms to escape him. Until a short while ago only the mountain-form, **montana** *Stgr.* (28 a), had received a name, beside the *pini.* *montana.*

obscura. *unicolor-brunnea.* *grisescens.* *externo-fasciata.* *unicolor-grisescens.*

typical form in Europe; it is deep dark brown in colour, densely scaled and very sharply marked; the white scaling is more dispersed in the hindwing, forming spots, and being only more condensed in a band along the inner side of the submarginal band. Here a dark form from the Southern Tyrol, should also be mentioned which belongs to *montana* in a wider sense, and which we name ab. **obscura** *ab. nov.* (28 c); the white scaling of the forewing is absent with the exception of a white inner edge to the very deeply coloured submarginal band. Rebel has lately given names to two extreme forms: ab. **unicolor-brunnea** *Rebel*, uniformly reddish brown with the markings of the forewing obsolescent, and ab. **grisescens** *Rebel*, uniformly whitish grey with normal markings on the forewing. As the markings of the grey specimens also vary greatly and as the name *grisescens* only applies to individuals with the markings fairly well developed, we feel justified in giving a name to two particularly aberrant forms, one, with the forewing uniformly whitish grey from the base, and very sharp black submarginal band, we call ab. **externo-fasciata** *ab. nov.*; the discal spot is much reduced, the inner bands altogether obsolete, the marginal area is darker grey, the hindwing light greyish brown. An altogether uniformly yellowish grey form with small sharp discal spot and greyish white fringes in which the outer band is also scarcely indicated by slight traces, may receive the name of **unicolor-grisescens** *ab. nov.* — The eggs are comparatively large, the size of a grain of hemp, oval, first bluish green, later on more grey. They are deposited in clusters of about 50 on the bark of pines. Larva light brown to predominantly grey, in the former case with irregular grey dorsal spots, on segments 3 to 10 near the hindmargin two black divergent streaks, as well as lateral black oblique streaks in between the abdominal segments. Venter grey with yellowish brown median spots. Stigmata white. Hairs grey or brownish, intermixed with black on the warts. The bristles and scales on the transverse spots and dorsal warts deep black, the smaller scales along the back white with a satiny gloss. Pupa blackish brown, the abdominal incisions and wing-cases dark reddish brown,, hairs and hooked bristles at the anal end lighter reddish brown. Moth from the end of June until August. The larvae feed almost exclusively on species of pine, preferably on the Scotch fir (Pinus sylvestris). They appear already in August and feed until the third change of skin in the autumn, when they seek their winter quarters on the ground, generally beneath the fallen pine-needles, also under moss, in a place as dry as possible. In the spring they go up the trees again and feed until the end of June. At this time they are most harmful. Pupation in crevices of the bark, also between the tips of twigs, in a dirty or greenish grey, dense, longitudinally oval cocoon, at the anterior end of which the projecting sharp bristes and scales of the girdle-spots form a kind of ring or collar. *Pini* is the worst enemy of pine-woods, and does a great deal of harm, especially in Central Europe, above all in large forests not interrupted by deciduous trees nor with thick undergrowth. It is considerably less abundant in North-Western Germany. It has moreover not yet been found noxious in the Baltic Provinces (Esthonia).

sibiricus.

D. sibiricus *Tschtvr.* (= laricis *Tschtvr.*). Very similar to *pini*, somewhat larger, uniformly black to brownish grey, sometimes with traces of reddish brown bands in the marginal and basal areas. Transverse stripes as in *pini*, the outer wavy one very broad, black and stronger than the others. The whole surface of the wing evenly strewn with large white scales, the discal spot of the forewing distinct. Antenna of ♀ with short but distinct pectinations. So far only known from the Ural, the Sajan and Bureja Mts., where it is said to have migrated from the East. The larvae, which bear a conspicuous resemblance to those of *pini*, live on Larix sibirica, and are very injurious, especially to young plantations; they are also said to have been found on firs though rarely, but this may be due to a confusion with *pini*.

superans. *spectabilis.*

D. superans *Butl.* (28 b). A very large species with uniformly dark greyish brown ground-colour, ♂ somewhat lighter than ♀, according to Butler with a large white basal subcostal spot on the forewing. The small white discal spot distinct, the blackish transverse bands also fairly well developed, especially the submarginal one, which has a sharp white inner edge; the median one with a broad grey cloudy edge. Japan. — **spectabilis** *Butl.*, described by its author as a distinct species, is remarkably dark, thorax and forewing being almost black; no discal spot, the white edge of the submarginal band separated into sharp spots. Size of a large *segregatus*. Japan.

segregatus. *bifascia.* *cinerea.*

D. segregatus *Butl.* (28 b). The characteristic representative of *pini* in Eastern Asia, most closely allied to it, and so far mostly placed together with this species, varying also in the same way. The ground-colour is less red than in *pini*, dark greyish brown, chocolate-brown to deep blackish brown, the hindwing in the latter case being however always lighter, the submarginal band of the forewing is particularly sharply defined, and consists of separate, often intensely black angulate spots which are still distinctly visible on the darkest ground-colour; the white sealing of the forewing accompanies the three transverse bands as a distinct edge, and is on the whole more extended than in *pini*. The hindwing also sometimes bears a white transverse band on the inner half. Distributed over the whole of Eastern Asia, the Amur and Ussuri districts, Northern China and Japan. We distinguish two forms: ab. **bifascia** *ab. nov.* (28 c), which is very common and in which the white margins of the two inner transverse bands are particularly strongly developed, especially in the ♀, so that the transverse bands themselves are reduced; and ab. **cinerea** *ab. nov.* (28 d), a form also abundant at Tsingtau, with the ground-colour of the forewing and the margin of the hindwing light yellowish grey, the submarginal band of spots being deep black. It corresponds about to ab. *externo-fasciata* of *pini*. — **dolosa** *dolosa.* *Butl.* is closely allied to *pini*, larger and darker. The inner band of the forewing grey, with a black band at the apex of the cell, the middle of the wing between the bands dark reddish brown, the outer band whitish, its black margin of spots very indistinct. Hindwing dull dark brown, costal and distal margins greyish. Japan. — **zonata** *Butl.* Dark chocolate, forewing with silvery white discal spot, transverse bands white, prominent, *zonata.* the outer one macular, and very wavy as in *pini*, middle of wing pitch-brown, marginal area beyond the outer band dark purple-brown. Japan. — **fentoni** *Butl.* Allied to *D. superans Butl.* Light rusty red, bands of fore- *fentoni.* wing and marginal area darker. The white discal band prominent, the outer band with a sharp white inner edge. Hindwing brown with lighter costal margin. Japan. — The last three insects were formerly treated as distinct species, but they are probably only forms of the very variable *segregatus*, perhaps one or the other belonging to the likewise closely allied *superans*.

D. punctata *Walk.* (28 d). A rather small dull brown species with whitish discal spot in the forewing, *punctata.* the transverse bands somewhat lighter than the ground-colour, yellowish brown with a dark edge. North China, also Hongkong.

D. remota *Walk.* A light coloured pale greyish brown species with whitish antennae and three slightly *remota.* wavy brownish yellow bands on the forewing, the outer ones still more diffuse than the two inner ones. Hindwing unicolorous with scarcely a trace of bands. North China, Shanghai. Probably only a form of the preceding.

D. undans *Walk.* A yellowish to reddish brown species confined to the Indian region in its typical *undans.* form, and represented in the Palearctic Region by a few forms; firstly, in Japan by ab. **excellens** *Butl.* (28 d, e), *excellens.* in the ♂ the greater part of the forewing light reddish ochreous, basal and marginal areas, the irregular waved transverse bands and the hindwing dark brown; the considerably larger ♀ is duller greyish brown, the light edges of the bands of the forewing are also not so light as in the ♂. A small white discal spot is distinct in both sexes. — **fasciatella** *Mén.* (= unicolor *Oberth.*), also from Amurland, Ussuri and Corea, is a smaller variety *fasciatella.* with uniformly reddish or greyish brown forewing in which the ochreous portion between the bands is absent; the bands are distinct. — **excelsa** *Stgr.*, from Amurland, Ussuri and Corea, is very like the Japanese *excellens*: *excelsa.* the ♂, as in *excellens*, has the disc bright ochreous, base and margin of the forewing and the hindwing are dark brown; the ♀ has paler markings, with light brown hindwing. — According to the description **flaveola** *Motsch.* *flaveola.* may also be only a form of *undans*.

D. bufo *Led.* (28 f). Light brownish or greenish grey, ♂ in the forewing with curved white subbasal and *bufo.* distal bands and white discal spot, these markings being at most only slightly indicated in the ♀. In both sexes a widely dentate row of black marginal spots on the forewing. A dark aberration of the species also occurs frequently, ab. **obscura** *Stgr.*, which is smoke-grey or blackish grey (cf. 28 f; the figure belongs more nearly to this form *obscura.* than to true *bufo*). In Syria and Palestine, as well as in the neighbouring districts of Asia Minor.

19. Genus: **Pachypasa** *Walk.*

Antenna of ♂ in basal half with extraordinary long pectinations, these quickly reduced in length beyond the middle and then fairly short to the apex; in the basal half the posterior pectinations are considerably longer than the anterior ones. Antenna of ♀ with short pectinations from the base. Palpi porrect, extending slightly beyond the frons, very densely scaled, with short and stumpy but distinct end-segment. Eyes naked. Frons smooth with dense hair directed forward. Body covered with dense long hair, abdomen very long, extending considerably beyond the anal angle of the hindwing in the ♂ by almost half its length. Femora and tibiae clothed with long hair, middle and hind tibiae with short end-spurs (*otus*) or without spurs (*lineosa*); tarsi smoothly scaled. Forewing elongate, almost regularly lanceolate, with rounded apex, distal and inner margins evenly curved and considerably more so than the costal margin, which is fairly straight in the basal half. Vein 2 near the base, 3 close before the apex of the cell, 4 and 5 stalked, 7 and 8 originating one after the other from 6, 9 and 10 on a long stalk emitted close before the upper angle of the cell; 2 to 9 into the distal margin, 10 into the apex. In the hindwing veins 2 and 3 close to the lower angle of the cell, from which originate 4 and 5 on a common stalk, 7 originates close to the base, 8 free at the base, then approximated to 7, and touching it at one point or connected with it by a short transverse vein; the accessory cell thus formed is moderately large, narrow and pointed. Accessory veins absent or indistinct in *otus*, while *lineosa* possesses three distinct accessory veins. Cell closed in both wings, very short and narrow. — Larva somewhat flattened with strongly developed lateral warts on all the segments, these being especially long and resembling legs on the thoracical segments. Beside the short bristly dorsal and long thin lateral hair the body is also clothed with rather broad large lanceolate scales, which are especially prominent in the middle of the back, but occur also on the lateral warts between the long hair. Ventro-lateral stripes of hair absent. Segments 2 and 3 with a dorsal, transverse, much raised and brightly coloured swelling, occupying nearly the entire breadth of the back and bearing a transverse incision opening and closing in the live specimen. Segment 11 with a broad flat hump, or all segments with two warts, which are especially well developed on segment 11. Pupa hairy, with stumpy anal end, in a dense silky or parchment-like cocoon. — The genus is represented by two species confined to the Mediterranean district, one of which, *lineosa*, occurs in the West, the other, *otus*, in the Central and Eastern countries.

otus. **P. otus** *Drury* (= dryophaga *Hbn.*) (28 e, f). The largest Palearctic Lasiocampid. Greyish brown, the forewing uniformly and densely dusted with black scales, with a very deeply and acutely indented median band and a more wavy oblique submarginal one, both usually with a narrow light edge on the sides away from each other. Southern Italy, Sicily and Greece, in the North from the Austrian coast districts to Roumania; Asia Minor, northward to Armenia, southward to Palestine. — Egg marbled with white and yellow, and with black dots (Treitschke). Ground-colour of larva yellowish brown and light grey, with the irregular longitudinal stripes and the markings on the lateral warts of considerable size, being one of the largest known Palearctic Bombycid larva. Hairs black on the back, grey at the sides and on the warts, the latter also bearing some black hairs. The scales on the middle of the back and on the sides white. The transverse swellings on segments 2 and 3 bright rust-red, with short bristly hairs of the same colour, the posterior one with a black longitudinal stripe in the centre. Underside more or less bright orange, with broad black longitudinal stripe; underside of the warts also black. Pupa blackish brown, in a long elliptical white or whitish grey dense woolly cocoon. Larva from July until May on Cupressus or Quercus pubescens, also on juniper. Moth from June to September. The larvae will also feed on our common oak. In breeding them one must put them into a cold room for hibernation, and must not keep them too damp.

lineosa. **P. lineosa** *Vill.* (28 f). Grey; thorax and forewing strongly variegated with white, abdomen and hindwing darker, forewing with a broad longitudinal pure white band, narrowly and distinctly edged with black, the anterior edge of the band bearing two deep pointed indentations; before the apex of the wing there are two isolated longitudinal streaks, proximally produced into a point and likewise edged with black. Southern France and Spain, North-West Africa. Larva similar to that of *Odonestis pruni*, grey with blackish longitudinal stripe, the swellings on segments 2 and 3 bright reddish yellow with similar hairs, segment 11 with two warts bearing tuft-like black hairs, two similar smaller warts also on the other abdominal segments. Lives until May on cypress (Cupressus sempervirens and fastigiata). Pupa dark brown with brown hair, light abdominal incisions and short stiff bristles at the anal end.

20. Genus: **Lebeda** *Walk.*

Antennae of ♂ densely and strongly plumose, the branches only becoming gradually slightly shorter towards the tip, in the ♀ also with evenly short pectinations to the apex. Palpi porrect, extending beyond the frons, very densely scaled, broader towards the apex, and obliquely truncate. Eyes naked. Frons smooth, densely clothed with hairs directed forward. Body densely hairy, abdomen extending considerably beyond the anal angle of the hindwing, slender and pointed, especially in the ♂. Forewing broad, costal margin rather stronglycurved, in the outer half, apex rectangular but slightly rounded, distal margin moderately strongly curved, inner margin slightly ventricose in the basal half, then somewhat incurved to the distal margin. Hindwing broad, distal margin evenly and strongly rounded, costal margin strongly and broadly incurved before the centre, then straight and oblique to the margin. Vein 2 of forewing originating near the base, 4 directly before the lower angle of the cell, from which 5 originates, 6 and 7 on a short stalk, the stalk together with 8 from the upper angle of the cell, 9 and 10 also on a short stalk, which is longer than that of 6 and 7, 2 to 9 into the margin, 10 into the apex. In the hindwing vein 2 beyond the middle of the cell, 3 close to the lower angle of the cell, from which originate 4 and 5 on a very short stalk, 8 anastomosing with 7 in a point directly beyond the origin of the latter, both veins elbowed where they touch. Basal cell moderately large, narrow, spindle-shaped, accessory veins obsolescent and indistinct. Cell of both wings closed. Cross-vein of forewing angulate in the middle, that of the hindwing near the anterior end. Femora and tibiae densely hairy, middle and hind tibiae with short end-spurs, tarsi smoothly scaled. Only one species occurs on Palearctic territory, being found in the North-Western Himalayas, just on the border between the Palearctic and Oriental Regions.

nobilis. **L. nobilis** *Walk.* (30 c). A very large species, the ♀ measuring more than 130 mm. in expanse. Light greyish brown with the markings darker, deep chocolate brown in the ♂. Forewing with sharp wedge-shaped discal spot, and four narrow light grey transverse bands, the middle ones of which enclose the discal area, which is deep chocolate brown in the ♂; a blackish longitudinal smear traverses the discal area at the height of the discal spot in the ♂, and is broadened beyond the outer band to form a dark marginal shadowy stripe reaching to the apex; before the hind angle a black double spot, mostly indistinct in the ♀. Hindwing deep dark brown, lighter in the ♀, with two parallel grey median transverse bands. On the underside thorax, palpi and basal half of forewing a deep black brown in the ♂, lighter in the ♀. Kashmir. Northern India, also elsewhere in the Himalayas (Silhet, Nepal, Naga Hills).

21. Genus: **Paralebeda** *Auriv.*

Allied to the preceding genus, as well as to *Pachypasa* and the next genus *Taragama*. Antennae sharply bent back in the middle, in the ♂ with the pectinations of the basal half very long, shorter towards the apex, the posterior branches longer than the anterior ones, in the ♀ the pectinations short and of even length. Palpi upturned, reaching to upper margin of eyes, densely and smoothly scaled, broader towards the apex. Eyes naked. Frons smooth, densely covered with porrect hairs. Body smoothly and densely hairy, abdomen extending far beyond the anal angle of the hindwing. Forewing of ♂ rather narrow and slender, broader in the ♀, costal margin only curved in the outer half, distal and inner margins rather straight, forming an obtuse rounded angle. Hindwing elongate, costal margin quite straight to the tip, distal margin moderately curved. Venation similar to that of *Lebeda*, but veins 6 and 7 as well as 9 and 10 on longer stalks in the forewing, 8 close beyond the cell from the stalk of 6 and 7 or directly from the apex of the cell; vein 10 into the apex, strongly curved at the end. Venation of hindwing as in *Lebeda*, but veins 4 and 5 on a slightly longer stalk; basal cell with a strongly forked accessory vein at the base and another short simple one beyond the centre. Femora and tibiae with dense long hair, middle and hind tibiae with moderately long end-spurs, tarsi smoothly scaled. — Larva flatened, with long lateral hairs. Lateral warts well developed, pediform, especially long and cylindrical on the thoracical segments, conical on the other segments. Ventrolateral stripes of hair absent. Segments 2 and 3 with two densely bristly, brightly coloured dorsal belt-like spots, segment 11 with flat hump. Dorsal scales absent. The typical species, P. *plagifera Walk.*, is represented in Amurland by a special form.

P. plagifera *Walk.* (30 d). A large species, the ♀ measuring almost 120 mm. Greyish brown, usually with a reddish tinge. Forewing with a deep chocolate brown spot occupying the grater part of the outer half, extending to the margin and to the apex, and only leaving a broad stripe at the outer margin; the inner and costal edges are very sharply defined and are bordered by a narrow black band originating in the middle of the inner margin, running obliquely outward close to the costal margin and then curved backward, running back to the inner margin, where the bounding line is usually narrowly white; in true *plagifera* the spot extends to the distal margin and to the apex without a definite edge, and is traversed by a continouous, more or less distinct, black submarginal dentate band ending in a sharp black spot at the hind angle. — In the form from Southern Amurland, **femorata** *Mén.*, the dark spot of the forewing is sharply bounded also distally along the recurring band, without extending to the margin. — Eggs very large, chalky white, deposited at the end of July in clusters of 6 to 12 on the underside of leaves. Larva (according to Graeser) resembling that of *Gastr. quercifolia* and *populifolia*, very large in proportion to the moth, on various deciduous trees (Phellodendron amurense, Populus tremula, Quercus mongolica, Corylus heterophylla, Tilia cordata, Syringa amurensis, and Pirus). The young larvae live gregariously usually at the tips of branches. After hibernating they are still found singly on tree-trunks. *plagifera.* *femorata.*

22. Genus: **Taragama** *Moore.*

Most closely allied to *Pachypasa*, very similar to this genus in the build of body and antenna as well as in the shape of the wings. The branches of the antenna of the ♂ become suddenly shorter in the apical half. The rather long porrect palpi are curved downwards at the tip, the end-segment is short, stumpy. Eyes naked. Body as in *Pachypasa* densely hairy, the patagia usually of a dark and conspicuous colour. Middle and hind tibiae with very short end-spurs entirely hidden in the hair. Forewing in both sexes elongate, with pointed apex, distal and inner margins evenly curved, hindwing shorter and broader in the ♂ than in the ♀, with strongly curved or even concave distal margin, the hind angle being rather well defined. In the forewing vein 4 originates close to the lower angle of the cell, but is distinctly separate from 5, 8 originates from the middle of the long stalk of 6 and 7, the stalk of 9 and 10 long, often considerably longer than the free ends of the veins. In the hindwing the veins are as in *Pachypasa*, a distal accessory vein leaves the spindle-shaped basal cell at the base, and often another vaguer one before the apex. Margin entire, with short fringes. Beside the dark discal spot, sometimes indistinct, the forewing usually bears two white basal spots and two undulate white transverse lines, between which there is a very dark large spot in the ♂. The ♂♂ are considerably smaller than the ♀♀. — Larva similar to that of *Gastropacha*, with the dorsal hair short, the lateral hair long and in tufts; the lateral warts are only well developed on the thorax. Segments 2 and 3 with dorsal girdle-shaped spot clothed with black hair, 4 to 11 with four dorsal warts each, two large anterior and two smaller posterior ones. Pupa clothed with short hair with the exception of the wing- and leg-cases. — The genus occurs in all the warmer regions of the Old World. The purely Palearctic species are confined to the Mediterranean area and have one representative in Amurland. Also a few Indien species must here be recorded, occurring in that part of the Himalayas which extends into the Palearctic Region.

T. repanda *Hbn.* (29 a). Very variable in size, ♀ up to 80 mm. in expanse. Head and tegulae grey in the ♂, patagia deep reddish brown, the rest of the body lighter reddish brown; in the ♀ the entire body grey, only the patagia rust-coloured with white edges. Forewing brownish grey with sharp white discal spot and irregularly dentate white submarginal band, as well as a black discal spot, which is only distinct in the ♂, in the middle of the costal margin also a white spot. In the ♂, between the discal spot and submarginal band and bounded by the latter, a large dark rust-brown to blackish brown spot. Forewing of ♀ more or less variegated with *repanda* rusty yellow. Forewing of ♂ dark reddish brown, of ♀ grey, with whitish fringes blackened at the anal angle. The typical form only occurs in Southern Spain and Morocco, where it is however very abundant. The only *aegyptiaca.* other known form, **aegyptiaca** *Bang-H.* (29 b), from Northern Egypt (Port Said, Cairo) is smaller, the forewing broader and more regularly rounded at the anal angle, lighter in the ♂, the large dark brown spot absent, or much reduced, the submarginal band more sharply curved inwards. ♀ greyish yellow, suffused with brownish, deviating still more strongly than the ♂; marginal area with irregularly diffuse whitish yellow band, which is much more conspicuous than the rust-coloured spots of the typical form. — The young larva is at first black with two long tufts of hair on segment 1, without any markings except a few very indistinct reddish dots, but after each change of skin the markings become more prominent. When full-grown the larva is bluish ashy grey with darker dorsal stripe edged with whitish and broadened on each segment in the shape of an escutcheon. On each side of this stripe on segments 4 to 11 two bright orange warts bearing brownish and black hairs, the anterior warts larger than the posterior ones. Hairs of body dorsally short and black, laterally long, yellow, being especially long on the lateral warts of the thoracical segments. The transverse swellings on segments 2 and 3 in their anterior half deep black, densely covered with reddish white bristles, and divided by a light longitudinal streak. Stigmata white edged with black. Underside yellow with broad black longitudinal stripe which encloses a yellowish spot on segments 4 to 11. Larva from the autumn until May or June, on species of Genista and Spartium, also on Pistachio and Tamarisk. Pupa glossy black, with reddish brown hair, in a whitish or yellowish grey, long fusiform, rather dense and firm cocoon, attached to thin twigs. Moth from January to September, in two broods.

alpherakyi. **T. alpherakyi** *Christ.* (30 b). Closely allied to *repanda*, as yet only known in the ♂. Forewing more elongate and pointed than in *repanda*: light greyish brown with broad, deep dark brown, median band sharply edged with white on both sides. Inner margin whitish yellow from the base to the inner edge of the band. Hindwing dark red-brown with a small whitish yellow spot at the anal angle. Fringes of both wings white. Head and thorax yellowish white, also on the underside, patagia reddish brown, abdomen also reddish brown with white anal hairs. Persia (Shahrud). Larva pale reddish grey with long tufted lateral hair, especially on the thoracical segments; from segment 4 with diffuse blackish dorsal and lateral stripe. The girdle-shaped spot on segments 2 and 3 velvety black, also hairy, divided in the middle, the anterior half on each side bright reddish brown. On segments 4 to 11 respectively two white warts edged with blackish bearing longer hairs. Underside reddish yellow, segments 4 to 11 with a dark brown double spot, and before it a yellowish spot or streak. Larva full-grown in June, moth in July. Pupa and cocoon not described.

primigenum. **T. primigenum** *Stgr.* Only the ♀ known, perhaps the other sex of *T. alpherakyi* (?). Head and thorax brownish white, patagia without light edge; body otherwise as in *T. repanda*. Forewing brown suffused with violet, with small white basal dot, the dark discal spot and the white costal marginal spot absent. The outer band very thin and obsolescent, only distinct in the anterior half, indicated by a dark smear at the distal margin; on the underside it is broader and of even width to beyond the middle of the wing. Hindwing lighter, pale brownish, with a rather obsolescent whitish median band. Ferghana. Larva and pupa not described.

stupidum. **T. stupidum** *Stgr.* (30 b). Allied to *T. repanda*. In the ♂ the forewing somewhat narrower, the hindwing more pointed, more triangular, with almost rectangular anal angle and incurved outer margin. The white basal spot rather indistinct, the inner light transverse band somewhat more distinct than in *repanda*, the outer one sharp and less curved, the dark brown median spot very sharply defined and on the posterior half of the wing extending slightly beyond the outer line. Hindwing dirty greyish brown, with very indistinct, obsolescent, lighter outer band. Body brownish grey, patagia dark brown, but on account of the darker colour of the body less prominent than in *repanda*. ♀ very similar to that of *repanda*, larger and darker brown, but the hindwing much lighter, whitish, only a median band and the distal margin dark brown, the underside also lighter, the outer white band of the forewing continuous or interrupted; the white costal marginal spot much weaker. The body lighter, dirty white. Ussuri district (Vladivostock), also in India. Early stages not yet known.

acaciae. **T. acaciae** *Klug* (29 b). A very beautiful brightly coloured species, white to yellowish grey and whitish grey in colour, the hindwing being lightest and unicolorous with the exception of the blackish anal angle, the forewing with a tooth-like projection formed of scales beyond the centre of the inner margin. Forewing with black sickle-shaped discal spot and broad blackish grey-brown median band, being irregularly incurved, especially distally, and having a glossy white outer edge. Beyond it a bright ochreous submarginal band also irregular, only continuous in the costal half, where it is often very dark. Fringes between the veins blackish. Upper Egypt. The larva lives on *Acacia*. Egg white with dark brown spot at one pole and a broad band of brown spots in the same half. Larva reddish brown, with dark brown head, lateral warts with long, tuft-like, grey hairs, these being especially long on the thoracical segments. The girdle-shaped patches on segments 2 and 3 black with hairs of the same colour. Segments 4 to 11 with dark brown median stripe, widened on each segment; also each with two small bright red wards, which are only longer on the last segment. Pupa dark brown, in a whitish grey spindle-shaped cocoon attached to the food-plant. Egypt.

T. dorsalis *Walk.* (= castanoptera *Moore*, igniflua *Moore*, hyperantherae *Moore*, intensa *Moore*) (30 c). *dorsalis.* Similar to *repanda*. Antennae light brown, head and thorax greyish white, patagia deep reddish brown, abdomen reddish brown with grey segmental edges. Forewing very dark red-brown, the black discal spot distinct, the white basal and costal marginal spot sharply defined; the white postdiscal band interrupted in the middle or continuing sharply defined to the inner margin. Hindwing of ♂ with greyish white anal spot, which in the ♀ continues to the costal margin as a broad indistinctly bounded median band. Fringes of both wings greyish white. Distributed over the whole of India to the Sunda Islands and the Philippines, northward to Kashmir (Kangra).

T. hyrtaca *Cr.* (= lusca *F.*, buddha *Lef.*, brahma *Lef.*, plagiata *Walk.*, bhira *Moore*) (29 a). Dark brown to *hyrtaca.* reddish or rusty brown. Very variable in size. Forewing with four narrow, fairly straight, whitish bands, in the ♂ an extended velvety black spot between the two middle ones, enclosing the sharply defined white discal spot near the inner margin; in the ♀ this spot as well as the black one are absent, and the space between the inner and outer bands is lighter, grey, so that between the two inner bands the darker ground-colour contrasts like a transverse band. A submarginal dark wavy line is often very distinct. Southern Asia to the Himalayas, also in China. — Larva dark green with pale brownish lateral tufts of hair. On segment 2 a red dorsal line behind a short dense tuft of hair. Segments 3 to 10 with oval dark brown velvety spots, each of which bears four blue warts with long hairs.

We add some Indian forms which extend nearly to the boundary of the Palearctic Region, but are not as yet known from Palearctic territory.

T. siva *Lef.* (= pallidum *Walk.*, ganesa *Lef.*, venustum *Walk.*, albicans *Walk.*). Body light yellowish *siva.* grey to greyish white, patagia light reddish brown, likewise the forewing, which only in the ♂ is more greyish with a yellowish brown basal spot and reddish brown median one; the two white bands sharply defined in the ♂, in the ♀ the median one only distinct at the costal and inner margins, and of the outer one only the costal marginal portion and a sharp spot between veins 4 and 5 developed. Hindwing of ♂ and ♀ greyish white with brownish marginal area. Fringes of both wings brown, blackish brown at the anal angle of the hindwing. India northward to the Himalayas. Larva light ochreous brown, the lateral warts bearing long tuft-like yellow hairs; the girdle-shaped spots on segments 2 and 3 large. Segments 4 to 9 with small black spots, 10 and 11 with pairs of larger warts.

T. recta *Walk.* Greyish brown, forewing with 4 straight, parallel, darker, transverse lines, two being *recta.* subbasal and two postdiscal, the outer one separated into spots. Submarginal line distinct, dark. Hindwing unicolorous, without lighter band. Northern India.

24. Genus: **Bhima** *Moore.*

Antennae in ♂ with very long pectinations at the base, the branches quickly decreasing in length and becoming gradually shorter to the apex, the hind row longer than the anterior one; the pectinations in the ♀ shorter and of more even length. Palpi short, porrect, hardly extending beyond the frons. Eyes with thin and short or with dense hair. Frons smooth, densely clothed with porrect hair. Body densely hairy, ♀ with thick broad anal tuft. Femora and tibiae covered with long dense hair, middle and hind tibiae with very short end-spurs; tarsi smoothly scaled. Forewing long, elongate, triangular, costal margin only slightly curved in the outer half, apex pointed, distal margin but feebly convex, forming a distinct angle with the nearly straight hind margin. Hindwing broad, with evenly convex distal margin, almost straight (♂) or slightly convex (♀) costal margin and quite straight inner margin. Margin of both wings entire, fringes very short. In the forewing vein 2 near the base, 3 beyond the middle of the cell, 5 directly behind 4 from the lower angle and 6 and 7 with short stalks from the upper angle of the cell, 8 from the fairly long stalk of 9 and 10; 2 to 8 into the margin, 9 into the apex. In the hindwing vein 2 beyond the middle of the cell, 3 close to lower angle of cell, 4 and 5 originate together from this angle or are shortly stalked; vein 8 first strongly curved costad near the base, then united with 7 for a shorter or longer distance, forming a rather large rhomboid or more spindle-shaped basal cell, from which two indistinctly branching accessory veins originate. Cell of both veins closed, discocellular vein curved in the forewing, quite straight in the hindwing, with the posterior portion directed distad. The wings are rather thinly scaled or even transparent, the forewing bearing, beside a white discal spot, five narrow whitish dentate bands, a subbasal pair parallel and close together and a postdiscal pair also close together, and one submarginal band. — Larva and pupa are not sufficiently described morphologically, but the larva has distinct warts bearing tuft-like hair, and a black tufted spot on segments 2 and 3. — The genus is absent from Europe and the Mediterranean districts. We know two East-Asiatic species, which appear to be restricted to the Amur country, as well as a South-Asiatic one, which occurs northward as far as Kashmir.

B. eximia *Oberth.* (29 d). Body of ♂ very dark brown, forewing blackish brown, slightly transparent *eximia.* in the middle, with dark veins, white discal spot and five narrow white dentate lines, a parallel subbasal pair and a postdiscal pair, and a submarginal line, the latter broken up and bounded by blackish spots at its inner edge. Hindwing ochreous with black-brown margin and larger black inner marginal spot. ♀ larger and lighter, body dark greyish brown, abdomen with dense whitish grey silky anal wool, wings dull brownish grey. Markings or forewing as in the ♂. Hindwing with broad diffuse dark median band. Amur and Ussuri districts. The egg hibernates. Larvae on Ostrya and Quercus mongolica, gregarious until the last moult, when they disperse. Pupation in the middle of August. Moth in the middle of September, single ♂♂ were still observed as late as the middle of October, when the first snow had already fallen. The ♀♀ only live for a short time, and soon after emerging copulate for about two hours. The eggs are densely covered with anal wool. The moths are easy to breed.

idiota. **B. idiota** *Graes.* (29 d). Similar to *eximia*, somewhat slenderer. ♂ deep blackish brown; wings densely scaled, forewing with small round whitish grey discal spot, marginal portion of both wings greyish yellow, in the hindwing the light colour extended basad in wedge-shape. The ♀ is dull brownish grey with pale yellowish grey markings, body also uniformly brownish grey, anal wool greyish yellow, not glossy. Amur and Ussuri districts. — Larva dark grey, irregularly variegated with black and reddish, and with reddish grey dorsal stripe. The short dorsal hair yellow and black, sparse, the long lateral tufted hair yellow, much intermixed with black on the thorax. The girdle-shaped spots on segments 2 and 3 velvety black with hair of the same colour. On the posterior portion of the remaining segments two elongate black spots. Underside with reddish yellow and grey markings and broad black median stripe. Larvae full grown in the late autumn, gregarious on the trunks of various deciduous trees, especially Prunus padus and Populus balsamifera, close together in large clusters. The hairs of the larvae easily come off when touched, remain in the skin and cause violent irritation. In contradistinction to *eximia* the species is difficult to breed. The pupa hibernates. Moth in June.

undulosa. **B. undulosa** *Walk.* Very dark brown, almost blackish brown, hindwing and abdomen of ♀ somewhat lighter, anal tuft light brown. Frons of ♂ with ochreous or greyish yellow hair. Forewing with sharp linear white discal spot, and five distinct white transverse lines as in *eximia* and *idiota*, the median one very strongly bentate. Hindwing with broad, darker, proximally diffuse, postmedian band, whose outer edge is more prominent decause bounded with a lighter colour. The species occurs only at the boundary of our region, being distributed from the Himalayas throughout India to the Sunda Islands. The Himalayan form from Kashmir (Kangra) is strongly variegated with grey in the ♀, and has the anal tuft white. This predominantly Indian species is more specially dealt with in Vol. X.

25. Genus: **Suana** *Walk.*

Closely allied to *Taragama Moore.* Antennae of ♂ as in that genus with very long pectinations at the base, which become considerably shorter at the apex, in the ♀ only dentate. Palpi long, porrect, extending considerably beyond the frons, the tip slightly curved downwards. Abdomen of ♂ very long, extending by at least half its length beyond the hindwing, ending in a long thin hairy point, in the ♀ also considerably longer than the hindwing. Tibiae without end-spurs. Forewing narrow, with very pointed apex, especially in the ♂, hindwing of ♂ triangular, costal, distal and inner margins rather straight and forming distinct angles with one another, hindwing of ♀ broadly rounded. Venation and other characters as in *Taragama.*

concolor. **S. concolor** *Walk.* (= bimaculata *Walk.*, ampla *Walk.*, cervina *Moore*) (29 c). ♂ reddish brown to very deep dark brown with a reddish tinge; very dark specimens have a violet gloss on body and forewing. Forewing with more or less distinct yellowish brown subbasal spot, silvery white sharp discal spot, and five somewhat diffuse narrow blackish dentate bands, viz., two subbasal ones, one discal and two postdiscal ones. ♀ usually lighter than the ♂, reddish brown to light greyish brown, sometimes also dark brown, forewing often strongly suffused with grey, when the dark bands become more conspicuous. Hindwing and abdomen usually pale greyish brown, as is also a broad band on the forewing between the discal and first postdiscal transverse lines. The white discal spot is often of considerable size in the ♀, but may also be altogether absent both in ♂ and ♀. Distributed throughout India, Ceylon, the Sunda Islands, to the Philippines, and northward to the Himalayas and Kashmir. The species shows an exceptionally strong sexual dimorphism; the wings of the ♀ are at least twice if not three times the length of those of the ♂. While the ♂ is at most 55 mm. in expanse, the ♀ may reach 155 mm.

Larva light brown, grey or greenish grey, with irregular black striae. Lateral warts bearing tufts of brown hair, the strongly developed girdle-shaped spots on segments 2 and 3 densely clothed with black hair. Segment 11 with a rather high hump bearing black hair. Pupa dark brown with lighter incisions, in a yellowish grey cocoon. Not rare, the ♂♂ especially frequently coming to the lamp at night.

26. Genus: **Arguda** *Moore.*

Antennae of ♂ with dense and long pectinations, the branches only gradually becoming shorter towards the tip; in the ♀ with short branches. Palpi strongly porrect with long end-segment, the scaling rendering them broad and shovel-like. Eyes densely hairy. Body covered with thick woolly hair, abdomen only slightly extending beyond the anal angle of the hindwing. Forewing broad, triangular, with pointed apex, costal margin only convex in the outer half, distal margin straight or angulate, almost at right angles with the straight inner margin. Hindwing broadly rounded. In the forewing vein 2 near the base, 3 from the middle of the cell, 4 and 5 close together from the lower angle, 6 and 7 on a short stalk from the upper angle of the cell, 8 shortly before it, 9 and 10 also on a short stalk. In the hindwing vein 2 from the middle of the cell, 3 shortly before the lower angle of cell, from which originate 4 and 5 close together or stalked, 8 close to the base anastomosing with 7 in a point or united with it by a short transverse vein, basal cell small and narrow, accessory veins usually indistinct. Cell of both wings closed. Margin slightly wavy or entire. Femora and tibiae with long dense hair, middle and hind tibiae with very short end-spurs, tarsi smoothly scaled. Distributed over the Indian and Australian countries.

A. flavovittata *Moore* (29 d). Yellowish brown. Margin of forewing produced into a point at vein 6. Forewing with blackish discal spot and a small blackish subbasal and discal band, the former with a narrow whitish edge on the inside and the latter on the outside, also with a submarginal row of whitish arcs edged with dark, the row being shifted a short distance distad below vein 4. Hindwing with grey median band which is only distinct in the costal half. Margin of both wings wavy, fringes dark brown. Kashmir; also in North India and the Himalayas. *flavovittata.*

Appendix and Corrections.

Malacosoma castrensis L., **angustata** *form. nov.* (24 e). A form from Anterior Asia closely allied to *kirghisica*, whith the same conspicuously light forewing in the ♂, and the light band on the forewing in the ♀ being also broadly edged with yellow; but well characterised by the narrow band of the forewing, which is strongly constricted in the ♀. *angustata.*

Malacosoma franconica Esp., **pallida** *form. nov.* (24 d). A very light pale greyish brown ♀-form entirely without the red ground-colour of the typical ♀ of *franconica*. — **obscura** *form. nov.* (24 d), another ♀-form, deep blackish brown in colour. This and the preceding form occur in Southern France. *pallida.* *obscura.*

Malacosoma alpicola Stgr., **cinnamomea** *form. nov.* (24 e), a ♀-form from the Issyk-kul distinguished from the ♀ of *alpicola* by the bright cinnamon tint of the ground-colour. *cinnamomea*

Alphabetical List

of the forms of Palearctic Lasiocampidae with a reference to the original descriptions.

* signifies that the form is also figured at the place quoted.

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8. Family: Lemoniidæ.

The genus *Lemonia*, formerly placed with the *Lasiocampidae*, and in 1895 still united with the Eupterotids (Strichnopterygids) by Aurivillius, is now regarded as the type of a distinct small family. It is distributed from Europe to Central Asia, and occurrs also in the Mediterranean countries, replacing as it were the Eupterotids and true Bombycids, which are absent. Among the characteristics of the family we call attention above all to the venation, in which *Lemonia*, however, closely resembles the Eupterotids, e. g., in vein 5 originating closely before the middle of the discocellular vein and in veins 6 to 10 being on a common stalk. On the other hand, in the Eupterotids the cell is not longitudinally divided by a vein-like fold running from the bend of the discocellular vein basad, or this cell-vein is only indicated. The position of vein 8 in the forewing is also very characteristic in *Lemonia*. The feeble, primitive, development of the frenulum also deserves mention. The structure of the legs with their minutely serrate and exceptionally strong claws is highly peculiar, being most conspicuous in the short, strong and stout fore legs, and probably unique among Lepidoptera. The absence of the cocoon is an important although more bionomical character, it is nevertheless the consequence of a morphological peculiarity of the larva, the absence of silk-glands. The pupae lie uncovered in the ground, a very curious circumstance for Lepidoptera which in their morphological structure and whole appearance undoubtedly belong to the Bombyces. The stout cylindrical larvae, which are almost without warts and are clothed with short hair, as well as certain external characters of the pupa (dorsal swelling, and structure of end of abdomen) are, moreover, additional peculiarities which, together with the characters mentioned above, render it evident that the genus represents an isolated and rather primitive type, and sufficiently justify the erection of a separate family for its reception.

1. Genus: **Lemonia** *Hbn.*

Antennae in the ♂ with long dense pectinations, in the ♀ with short ones, the branches being longest in the middle and becoming rapidly much shorter towards the apex. Palpi short, porrect, scarcely extending beyond the frons, clothed with long dense hair below, especially in the ♂. Eyes naked. Frons smooth, clothed with comparatively short hair, thorax and abdomen covered with long and dense hair. Forewing triangular, with rather pointed apex, costal margin almost straight, only slightly convex before the apex, distal margin evenly convex, joining the slightly bent inner margin in a broad curve. Hindwing broad, with almost straight costal margin and regularly convex distal edge. The distal margin of both wings entire. Forewing with 12 veins: vein 2 from about the middle of the cell, 3 and 4 separate, from the lower angle of the cell, 5 from the discocellular vein, originating somewhat nearer the upper than the lower angle 6, 7, 8, 9 and 10 on a common stalk from the upper angle of the cell, or 6 almost directly from the apex of the cell; 11 close before the apex of the cell, 12 strong, placed close to the anterior margin of the cell; 2 to 8 into the distal margin, 9 into the costal margin. Hindwing with 8 veins: 2 from the middle of the cell, 3 and 4 far apart, from the lower angle of the cell, 5 from the discocellular vein near its anterior end, 6 and 7 from a point or on a very short stalk from the upper angle of the cell; 8 strongly curved near the base, then almost straight to close before the apex of the wing, connected with the anterior margin of the cell by a very short transverse vein or united with 7 for a short distance beyond the cell; 1 b to 6 into the distal margin, 7 into the apex. Cell closed in both wings and divided by a thin longitudinal vein, which originates from the sharp angle of the lower portion of the cross-vein. Fore legs very short, stout and strongly built, femur as long as tibia and tarsus together, stout and somewhat compressed, carinate above, flat below, tibia and tarsus about equally long, claws exceptionnally large and stout, almost as long as the tarsus, minutely denticulate below. Middle and hind legs moderately long, of normal shape, the claws likewise rather stout, but not nearly so much as in the fore legs. Middle tibiae with two spurs, hind tibiae with two or four. — The globular eggs bear a dark dot at one rather flattened pole, and also a dark median ring (*dumi*). The larvae are stout and cylindrical, with rather sparse stiff hair. Warts very feebly developed, segments 2 to 11 with four dorsal warts placed in pairs and three still less developed lateral warts. The warts bear rather longer and stiffer hairs. The colour of the body is uniformly dark, the markings consisting of velvety black transverse bands interrupted in the middle. The larvae pupate in the ground without a cocoon. The rather glossy pupa is covered with minute dots on the abdominal segments. The anal end is strongly chitinised, flattened dorso-ventrally and ends in two spiniform points, and also bears two small bristles on each side. At the base of the abdomen a transverse swelling divided in the centre. The moths are on the wing in the summer and autumn.

L. taraxaci *Esp.* (30 a). Head and thorax bright yellow, back of abdomen black, lateral margins and apex *taraxaci.*
the colour of the thorax. Wings uniformly ochreous in the ♂, lighter in the ♀, greyish yellow; forewing with
small black discal spot. Central Europe, southward to Southern Italy, eastward to Southern Russia. — ab. ♀
strigata *Rbl.*, from Zara, has a dark grey postdiscal transverse stripe on the forewing, which is indistinctly con- *strigata.*
tinued on the hindwing. — **terranea** *Roths.*, from Le Lautaret in the High Alps of Savoy (2000 to 2300 m.), as *terranea.*

yet only known in the ♂ sex, is probably an Alpine form; it is distinguished by the darker brownish coloured wings, but lighter specimens also occur in which only the marginal portion is darker. — Larva yellowish brown on the upper side, laterally and ventrally blackish brown. Segments 2 to 11 each with two velvety dorsal stripes, the anterior one very broad, the posterior one narrower, both broadly interrupted in the middle. Hairs and warts yellowish brown like the upperside. April to the beginning of June, on sunny meadows and railway embankments, on Taraxacum, Hieracium, etc.; also feeds by day in the sunshine. Pupa rather slender and glossy, reddish brown.

dumi. **L. dumi** *L.* (= dumeti *L.*) (30 a). Body clothed with a mixture of clay-coloured and black hairs. Wings blackish brown, lighter in the ♀, with a sharp clay-coloured median band broader on the forewing, and fringes of the same colour; on the forewing a large yellow discal spot. Distributed throughout Central Europe with the exception of England, northward to Sweden and Finland, eastward through Hungary to Southern Russia and Turkey. — Egg with dark median band and dark dot at one flattened pole. Larva blackish brown slightly tinged with violet, clothed with yellowish brown hair. Segments 4 to 10 with two velvety transverse black bands broadly interrupted in the middle, the posterior one broader, the anterior one narrower and anteriorly edged with yellow; on segment 3 only the posterior band is developed, on 11 only the anterior one. Between these two broader bands there is a third, very narrow and more lateral one. From May to August on meadows, on various low-growing plants, Taraxacum, Hieracium, etc. The pupa rather frequently hibernates more than once. In order to induce the larvae to pupate it is advisable to put some clumps of earth, not too dry, into the cages, in which they make cylindrical cells for the pupae (Bretschneider). The moths appear in the late autumn; the ♂♂ are on the wing on sunny days in October, on clearings in the woods, especially high pine woods, their flight being wild; they are difficult to catch, as one easily looses sight of them.

vallantini. **L. vallantini** *Oberth.* (29 f). Uniformly clay-coloured, with continuous diffuse blackish median band on both wings, forewing with sharp black discal spot. Algeria.

sacrosancta. **L. sacrosancta** *Püng.* Allied to *vallantini Oberth.*, ground-colour pale greyish yellow, the dark band rather obsolescent on the upperside, being only indicated as a slight shadow on the hindwing, but more distinct beneath. Forewing with small sharp discal black spot, which is absent beneath, and with narrow dark marginal band. Palestine.

ballioni. **L. ballioni** *Chr.* Allied to *balcanica H.-Schäff.*, the antennae with longer and stouter pectinations, forewing somewhat more pointed. Body and wings dull ochreous. Forewing with dark brown round discal spot, median band brownish, slightly curved, diffuse and abbreviated before the inner margin, with a white *pontica.* outer edge. Hindwing without band. Caucasus, Armenia. — In the Armenian form, **pontica** *Auriv.* (29 f), the median band is present on both wings, being particularly sharp on the forewing and dark brown. — The species varies greatly in the development of the basal and discal spot.

balcanica. **L. balcanica** *H.-Schäff.* (= bremeri *Koll.*) (30 a). Body and wings uniformly greyish brown, darker in the ♂, rather pale in the ♀. Forewing with large dark brown discal spot edged with whitish, absent on the underside; both wings with narrow curved whitish median band and a marginal one of the same colour. According to Herrich-Schäffer the ♀ is darker than the ♂. Bulgaria, Armenia. — Egg grey, with two white rings and a dark dot at one pole. Larva velvety black with yellowish brown hair and broad violet-grey incisions, more greyish brown laterally. At the posterior edges of the segments sometimes two orange-yellow spots. In the autumn and probably also in the winter on chicory.

pauli. **L. pauli** *Stgr.* (30 b). Also regarded as a variety of *ballioni Chr.* Varying in ground-colour from dirty ochreous suffused with blackish grey to dark brown-grey, the dark brown curved band beyond the middle of the wing distinct on both wings, in dark specimens obsolescent, with lighter outer edge. Both wings also with dark marginal line. The blackish discal spot in the forewing small, in a light cloud. In the outer half, especially in the forewing, the veins are whitish, somewhat recalling *philopalus Donz.* Palestine.

pia. **L. pia** *Püng.* Also allied to *balcanica.* Ground-colour brown, both wings with a white band, which is sharply marked and runs almost straight across the forewing, but in the hindwing is slightly curved, ending before the inner margin. Forewing with small sharp discal spot, in a more or less distinct light cloud. The discal spot is absent on the underside. Palestine, Dead Sea, where it was caught in the autumn.

philopalus. **L. philopalus** *Donz.* (30 a). A species holding quite an isolated position in the genus on account of its peculiar markings: ground-colour blackish brown, with which — excepting a broad costal marginal stripe in the forewing — all the veins contrast as sharp whitish yellow lines which are widened at the margin to form a narrow marginal line of the same colour. Fringes also light. At the apex of the cell of the forewing a small dark discal spot surrounded by light scaling and diffuse light central dot. Hindwing, with the exception of the marginal portion, paler than the forewing. Southern Andalusia and Algeria.

sardanapalus. **S. sardanapalus** *Stgr.* (30 a). Somewhat smaller than *dumi*, to which it is comparatively most closely allied. Head and thorax olive, abdomen black and like the thorax clothed with long grey hair. Forewing dark brown or somewhat lighter, hindwing black, both with sharp white W-shaped median band, especially broad on the hindwing; from the inner side of this band on the forewing before and beyond the cell a narrow prolongation extends to near the costal margin. Basal portion of the costal margin of the forewing and a subbasal spot reaching to the inner margin, as well as the fringes of both wings likewise white. On the underside the forewing is almost entirely white from the base to the band, with large blackish discal spot. Ferghana and Turkestan (Samarkand). — Larva dirty grey, with two rather large whitish triangular dorsal spots on each segment from 2 to 10, as well as smaller spots anteriorly on segments 4 to 8; among the white spots are black ones, and below them laterally small black streaks. Warts dirty orange with sparse long black hairs, small orange-coloured dots on the black dorsal spot. The larvae are very common where they occur. The moths are on the wing at the end of September and in October, i. e. like the European species at a season unfavourable for collecting, which may explain their rarity in collections as compared with their abundance in Nature.

Alphabetical List

of the Palearctic *Lemoniidae* with a reference to the original descriptions.

* signifies that the form is figured at the place quoted.

balcanica Lem. *H.-Schäff.* Syst. Schmett. Eur. II, p. 109.
ballioni Lem. *Christ.* Hor. Ent. Ross. 22, p. 310.
dumi Lem. *L.* Faun. Suec. p. 293.
pauli Lem. *Stgr.* Iris 7, p. 267 *.
philopalus Lem. *Donz.* Ann. Soc. Ent. Fr. 1842, p. 198 *.
pia Lem. *Püng.* Iris 14, p. 143 *.
pontica Lem. *Auriv.* Iris 7, p. 188.
sacrosancta Lem. *Püng.* Iris 14. p. 141.
sardanapalus Lem. *Stgr.* Stett. Ztg. 1887, p. 99.
strigata Lem. *Rbl.* Berge's Schmett.-B. (IX), p. 131.
taraxaci Lem. *Esp.* Eur. Schmett. Abb. *.
terranea Lem. *Roths.* Ann. Mag. Nat. Hist. (8) 3. 1909, p. 7.
vallantini Lem. *Oberth.* Ét. d'Ent. 13, p. 28 *.

9. Family: Eupterotidæ.

The few species of *Eupterotidae* which must be dealt with among the Palearctic Lepidoptera are tropical, with the exception of two, and belong to the Indian fauna. No representative of this almost exclusively tropical family is found in Europe or Western Asia, or in the entire Mediterranean area. It is therefore unnecessary to draw attention to more than the most important characters. The Eupterotids, also known as Strichnopterygids, Phialids, or Janids, are a large but well defined family, in structure and facies resembling the Saturnids and Bombycids. They were formerly united with the *Lasiocampidae*, for instance by Herrich-Schäffer. The family contains forms of considerable size, some of them being hardly inferior in expanse to the large tropical Saturnids. The smallest species are at least of medium size. The antennae of the ♂ always with very long dense pectinations, those of the ♀ often only with short ones. Palpi at most of medium length, slightly upturned and densely hairy. Tongue small or absent. As regards venation the position of vein 5 is characteristic, this vein originating on both wings in the middle or even close to the upper end of the cross-vein. In the forewing vein 1 is simple at the base or forms a rounded fork. Veins 6 to 9 usually on a common stalk, 10 as a rule absent. In the hindwing vein 8 is free from the base, or connected with the anterior margin of the cell by a short transverse vein. The frenulum is absent or in rare cases feebly developed, at most somewhat more strongly in certain ♀♀. Hind tibiae with two or four spurs. — The larvae are as yet not well known. They are cylindrical, bearing tufted hair, the dorsal tufts especially being very long. Warts only slightly developed. In facies the larvae resemble those of the Lasiocampids and Arctiids. Pupation takes place in a dense cocoon as in the Saturnids.

All the genera of *Eupterotidae* treated as Palearctic, as well as all the species except two, are typical representatives of the Indian fauna, and only concern us here because they occur at the boundary of our Region.

1. Genus: **Ganisa** *Walk.*

Palpi upturned to the centre of the frons, and densely scaled. Forewing broad, costal margin evenly and slightly convex, apex pointed, rectangular in the ♂, somewhat produced in the ♀, distal margin slightly convex, inner margin feebly convex, hindwing elongate but broad, apical and anal angles distinct, distal margin moderately curved, as in the forewing entire and with long fringes. In the forewing veins 3 and 4 rather widely apart, 5 before the middle of the discocellular vein, 6 from the upper angle of the cell, 7, 8 and 9 stalked. In the hindwing veins 6 and 7 from the upper angle of the cell or stalked. Legs densely hairy, median tibiae with two long spurs, hind tibiae with four. — The genus occurs in Southern Asia, one species, however, also being found in the Palearctic districts of the Himalayas.

G. postica *Walk.* (29 e). Head dark brown, body brownish grey. Wings lighter grey with brownish *postica.* markings and similar fringes. In the forewing a small black discal spot, two subbasal and three discal wavy brown curved lines, as well as a sharp black-brown double band running from the apex to the inner margin and being only divided by a narrow grey wavy line. Hindwing with three discal wavy transverse bands and a somewhat sharper simple submarginal line, behind which is a row of black-brown dots. On the underside, instead of the transverse band of the forewing and the submarginal line of the hindwing there is a further wavy curved line. In the Palearctic Region found in Kashmir (Kangra, Kulu), also distributed throughout Anterior India and Ceylon, everywhere abundant.

2. Genus: **Apha** *Walk.*

Palpi upturned to the centre of the frons, broadly scaled. Antennae very regularly pectinate, ends of the pectinations in a straight line from the base to the apex. Forewing broad, apex pointed, rectangular and slightly prolonged, distal margin moderately curved, forming a distinct angle with the nearly entirely straight hind margin. Hindwing almost circular. In the forewing veins 3 and 4 close together from the lower angle of the cell, 6 from the upper angle, 7, 8 and 9 stalked, 10 usually absent. In the hindwing veins 3 and 4 as in the forewing, 6 and 7 stalked, 8 connected with the anterior margin of the cell by a very short transverse vein close to the base; vein 5 from the middle of the discocellular vein in both wings. Legs densely hairy, middle and hind tibiae with moderately long spurs. The genus is distributed from Japan to Southern Asia, and represented in the Palearctic Region by two Japanese species. All the species are of medium size and have on both wings a sharp oblique band with light edges.

A. tychoona *Butl.* (29 e, f). A species varying greatly in the ground-colour. The lightest specimens *tychoona.* are almost entirely yellow, with even a greenish tinge, the dark ones brownish red to olive. The most common form is brownish with a slight greyish tinge. On the forewing the sharp blackish oblique band distally edged with yellow runs from the apex to the middle of the inner margin, on the hindwing straight across the middle; forewing with two subbasal and two discal dentate bands, widened to form spots at the inner margin and interrupted before the middle, beside a small black discal dot; in the marginal area two blackish wavy lines. Hindwing with a subbasal band only slightly indicated and two rows of alternate black spots in the marginal area. Underside of body bright yellowish red, that of the wings yellow with widely extended reddish and blackish brown markings. Japan.

hyalinata. **A. hyalinata** *Butl.* (30 b). A remarkably small species even for this genus, expanding only 30 mm. Forewing uniformly dark brown with black discal spot and several blackish transverse bands, before the apex a smaller and a larger vitreous spot. Costal and inner marginal areas of hindwing bright yellow, the rest darker, the oblique transverse stripes black. Japan. The ♂ of this species flies by day and on the wing strongly resembles an *Orgyia*. Like the latter it is not easy to catch. Butler places the species with *Prismosticta* and describes it as a Bombycid, to which family it forms a transition. The figured specimen, like the type, came from Nikko. The species is recorded from Kiushiu as well as the Main Island; it does not appear to be common.

3. Genus: **Apona** *Walk.*

Antennae of ♂ with extraordinarily long and dense pectinations, in the ♀ with shorter ones. Palpi upturned to half the height of the frons, with very long hair on the underside. Forewing broad with sharp rectangular apex, distal margin moderately curved, very slightly concave below the apex; inner margin quite straight; hindwing with rather sharp apical and anal angles; distal margin of both wings slightly wavy. In the forewing vein 6 from the upper angle of the cell, 7, 8 and 9 stalked, 10 absent; in the hindwing 6 and 7 from the upper angle of the cell, 8 touching the cell at a point close beyond the base; discocellular vein of both wings broken below vein 5. The genus comprises rather large species and is on the whole South-Asiatic, but a special form occurs in China.

caschmirensis. **A. caschmirensis** *Koll.* (29 e). Greyish brown, basal half of both wings whitish grey to the postdiscal band. Both wings with a discal and a postdiscal narrow dark band, the latter very sharp on the forewing, with a white inner edge and a broad dark shadowy outer one ending in a deeply sinuous wavy line. In the hindwing a similar but less distinct submarginal transverse shadow. Forewing also with a small dark discal spot. In the North-Western Himalayas and Northern India.

mandarina. **A. mandarina** *Leech.* Closely allied to *caschmirensis*, varying in ground-colour from ashy grey and light greyish brown to dark brown. Central and West China.

4. Genus: **Eupterote** *Hbn.*

A typical Oriental genus fairly rich in species, which are on the whole of very considerable size, some being very large. Antennae of ♂ with long pectinations, of ♀ with short ones. Palpi moderately large, porrect and slightly upturned, with long and dense hair beneath. Hair on the thorax long, that on the abdomen shorter. Forewing broad, triangular, costal margin rather strongly curved only towards the apex; the latter slightly rounded, distal margin only very slightly curved, forming a distinct angle with the inner margin. Hindwing also broad, apical and anal angles rounded but distinct, distal margin moderately curved. In the forewing vein 5 very near the anterior end of the discocellular vein, 6 from the upper angle of the cell or on a short stalk with 7, 8 and 9; 10 absent. In the hindwing vein 5 as in the forewing, 6 and 7 together from the upper angle of the cell or on a short stalk, 8 from the base of the cell, free from its origin. Femora and tibiae with fairly long hair, middle and end spurs small, not projecting from the hair. The predominant colours are yellow, brown and grey. The markings consist of dark transverse bands, which continue at the same breadth over both wings, consisting of a number of parallel wavy lines, a postdiscal, double or single, not wavy line is generally the most distinct, and a deep dentate submarginal line, in which frequently large black spots are placed. In these markings they resemble certain Saturnids, for instance the genus *Antheraea*. Distributed over the whole of Southern Asia and the Sunda Islands to the Philippines. Only one Chinese species is purely Palearctic. The two commonest Indian species, which are at the same time among the largest species of the genus, *E. fabia Cr.* and *undata Blanch.*, occur in the Himalayas as far as the most Southern boundary of the Palearctic Region, and must therefore be mentioned here. They are, moreover, so closely allied with one another that there is hardly justification for keeping them separate as species if not for the sake of convenience.

fabia. **C. fabia** *Cr.* (29 f). A large species, up to 130 mm. in expanse. ♂ bright ochreous yellow or chrome-yellow, ♀ with the same ground-colour or of a more brownish or reddish shade, also in the markings. Very variable in pattern, the wavy band and submarginal dentate line often very obsolescent, between the latter and the postdiscal band of the forewing usually a few larger black spots, close behind the postdiscal band of both wings a row of mostly distinct black dots on the veins. On the other hand, the markings, especially in the ♀, may be very extended and prominent. Throughout India and Ceylon, northward to the Himalayas. — Larva deep dark brown with hairs of the same colour, the dorsal tufts consisting of short and long hairs, the lateral and ventro-lateral ones only of short hairs. On each side three longitudinal rows of tiny white dots extending the whole body. Segments 5 to 11 with two dorsal rows of reddish warts. Anal legs flesh-colour. Pupa blackish brown with light abdominal incisions, in a dirty greyish brown cocoon densely intermixed with the hairs of the larvae.

undata. **C. undata** *Blanch.* Very closely allied to *fabia*, but darker on the whole, ground-colour light to dark brown or also of a reddish or even yellowish shade. In the markings, in which it also agrees with *fabia*, the species is just as variable as in colour, and therefore has occasioned many synonyms. It occurs more in North India, and goes as far as Further India (Burma). On account of the great variability of the species several forms from the boundary between the Palearctic and Oriental Regions may be distinguished: *fraterna.* **fraterna** *Moore* (30 d), from Kashmir and Northern India, is a form of a uniform and distinct reddish, almost light wine-red shade, with the markings rather feebly developed; the postdiscal band double. — *griseipennis.* In **griseipennis** *Moore*, a more greyish brown form also occurring in Northern India, there are distinct dark spots between the postdiscal and submarginal bands, which are absent in *fraterna*. — *assimilis.* **assimilis** *Moore*, a grey-brown form from the North-Western Himalayas, also has black submarginal spots, but those below the apex of the wing are shaded with whitish grey. — *dissimilis.* **dissimilis** *Moore*, likewise from the North-Western Himalayas (Dehra Dhoon), has a broad dark purple-brown postdiscal band with larger black spots beyond it on a brownish yellow ground. — *sinuata.* In **sinuata** *Moore*, from the Himalayas, a reddish brown form similar to *fraterna* in colour, the space beween the double postdiscal band and the particularly sharp black submarginal dentate band is somewhat lighter and also bears black spots, the last but one in cellule 2 of the forewing being particularly large and deep in colour. — *affinis.* **affinis** *Moore*, a dark yellowish brown form from Northern India, has the markings fairly well developed; the postdiscal band is particularly prominent, the black spots being also well developed.

chinensis. **E. chinensis** *Leech.* Antennae, head and fore legs dark brown. Wings of ♂ light yellow, darker in the ♀, with chocolate-brown markings: a few spots at the costal margin and at the apex of the forewing, two faintly indicated postmedian lines, which however only extend from the costal margin to vein 6, as well as a rather indistinct submarginal dentate band, before which there are two black spots near the inner margin. Hindwing with indistinct submarginal band before which near the costal and inner margins are dark spots. In the ♀ the dark markings at the costal margin and apex of the forewing as well as the submarginal band are absent. On the underside the dark costal marginal markings are more extended than above. China. The only known purely Palearctic species.

5. Genus: **Brachyptera** *Feld.*

Distinguished from *Eupterote*, with which Hampson unites it, by the more elongate, less triangular, forewing; the costal margin is only slightly curved before the apex, the apex itself sharply rectangular, the distal margin also not strongly curved and forming a distinct angle with the inner margin. Hindwing similar to that of *Eupterote*. — This genus also is almost exclusively Oriental, the only known Palearctic species inhabiting Japan. The species are of medium size.

aequalis. **Br. aequalis** *Feld.* (30 b). Body and wings brownish yellow, both wings with a black discal spot and a dark double straight postdiscal oblique band running from the apex of the forewing to the abdominal margin of the hindwing. Forewing, moreover, with two somewhat diffuse dark broken subbasal bands and a likewise diffuse discal dentate band. Hindwing with a deeply indented submarginal band, at the tips of the teeth of which there are small blackish spots. Japan.

6. Genus: **Sangatissa** *Moore.*

Antennae of ♂ with very long pectinations, of the ♀ with short ones. Palpi moderately large, slightly upturned, clothed with dense long hair. Forewing elongate with pointed apex, distal and inner margins continuous in a broad curve. Hindwing with nearly straight costal and inner margins, as well as moderately curved distal margin. In the forewing veins 3 and 4 close together at the apex of the cell, 5 near the upper end of the discocellular vein, 6, 7, 8 and 9 stalked. In the hindwing vein 5 as in the forewing, 6 and 7 stalked. Only one species of this genus is known, being distributed throughout India and Ceylon.

subcurvifera. **S. subcurvifera** *Walk.* (29 e). Antennae and body pale yellowish brown, wings likewise, but with an extended whitish tone in the middle; forewing with three reddish black-brown longitudinal bands converging at the apex, the outer one close to the distal margin, hindwing with a postdiscal and a marginal band of the same colour. All bands interrupted at the veins. Extends northward to the North-Western Himalayas, where the species enters the Palearctic Region in Kashmir.

Alphabetical List

of the Palearctic forms of *Eupterotidae* with a reference to the original descriptions.

* signifies that the form is also figured at the place cited.

aequalis Brach. *Feld.* Novara. Lep. 4 *.
assimilis Eupt. *Moore*, Trans. Ent. Soc. Lond. 1884, p. 363.
caschmirensis Apona Koll. Hügels Kaschm. 4, p. 472. *
chinensis Eupt. *Leech*, Trans. Ent. Soc. Lond. 1898, p. 274.
dissimilis Eupt. *Moore*, Trans. Ent. Soc. Lond. 1884, p. 368.
fabia Eupt. *Cr.* Pap. Exot. III. *
fraterna Eupt. *Moore*, Proc. Zool. Soc. Lond. 1888, p. 406.
griseipennis Eupt. *Moore*, Trans. Ent. Soc. Lond. 1884, p. 362.
hyalinata Apha *Bull.* Cist. Entom. III, p. 125.
mandarina Apona *Leech*, Trans. Ent. Soc. Lond. 1898, p. 260.
postica Gan. *Walk.* Cat. Lep. Het. Br. Mus. 5, p. 1190.
subcurvifera Sang. *Walk.* Cat. Lep. Het. Br. Mus. 32, p. 375.
undata Eupt. *Blanch.* Jacquem. Voy. Ind. Ins. p. 23 *.
tychoona Apha *Bull.* Ent. Month. Mag. 14, p. 207.

10. Family: Bombycidae.

The typical representative of this small family, which is confined to the tropics and subtropics, is the well-known silk-moth *Bombyx mori*. All Bombycids are only of medium size, with densely hairy body and short broad wings. The forewings have an often very deep sinus in the upper half of the outer margin, which, in conjunction with the strongly convex distal portion of the costal margin, gives the apex a strongly sickle-shaped appearance. In the venation the Bombycids resemble the Eupterotids and Saturnids. Vein 5 of both wings originates in the middle of the discocellular vein, 6 to 10, or 7 to 10 are stalked; three inner marginal veins present in both wings. Vein 8 in the hindwing connected with the cell by a transverse vein or touching it in a point. The distal margin of the wings is usually distinctly dentate at the ends of the veins. Antennae of both sexes with long pectinations, the branches only becoming shorter towards the tip. Palpi mostly small and inconspicuous, or even altogether absent. Tongue also absent. Larvae elongate-cylindrical, clothed with only very short hair, so that at first sight they appear naked. Thorax enlarged at segments 2 and 3, on segments 3, 5 and 8 there is a hump, on 11 a small horn. Pupation takes place in a dense oval cocoon, from which the raw silk is obtained in the silk-moth.

As in the Eupterotids, no indigenous representative of the Bombycids is found in Europe or in the entire Mediterranean district. The silk-moth too is only introduced from Southern Asia, being a domesticated species. However, the family is represented by a few species in Eastern Asia. The systematic position of *Dalailama bifurca Stgr.* (30 b), described from Tibet, is still somewhat doubtful.

1. Genus: **Bombyx** *Hbn.*

Antennae of ♂ and ♀ with long pectinations. Palpi short, a mere remnant. Eyes naked. Frons smoothly hairy. Body evenly hairy, abdomen conical in the ♂, very broad, stout and clumsy in the ♀. Wings broad, forewing triangular, costal margin first straight, only strongly curved before the apex, below the rounded but projecting apex the distal margin is sinuate to vein 4, more deeply in the ♂, more shallowly in the ♀, the hind portion of the margin straight, slightly dentate at vein 2, inner margin nearly straight; hindwing broad, distal margin strongly curved and slightly dentate at the ends of the veins, anal angle also projecting. In the forewing vein 2 from the middle of the cell, 4 from the lower angle of the cell, 5 from the discocellular vein just below the middle, 6, 7, 8, 9 and 10 on a common stalk from the upper angle of the cell, 6 close to the base of the stalk, 7 and 8 as branches of equal length from the apex, and 11 close before the apex of the cell. In the hindwing vein 2 from the middle of the cell, 3 and 4 close together from the lower angle of the cell, 5 from the middle of the discocellular vein, 6 and 7 on a short stalk from the upper angle of the cell, 8 free from the base, connected by an oblique transverse vein with the anterior margin of the cell. Cell of both wings closed. Discocellular veins slightly concave. — Larva cylindrical, with very short sparse hair, only slightly longer in the region of the anal legs; segment 1 short and narrow, 2 and 3 broad and strongly dome-shaped, the whole anterior end appearing stouter and somewhat swollen. Segments 3, 5 and 8 each with two small prominences, and 11 with a short horn.

B. mori *L.* (= sinensis, croesi, fortunatus, textor, arracanensis all of *Moore* and *Hutt.*, plana *Walk.*) (35 a). Mulberry Silk Moth. Body and wings whitish grey, pectinations of antennae brown. Wings with distinct or indistinct, sometimes even quite obsolescent brown markings, forewing with a lunule on the discocellular vein, two parallel strongly curved antemedian transverse lines and an almost straight postmedian one, which is generally the most sharply defined and accompanied by a dark shadow on the outer side; also with a narrow submarginal lunate line. Hindwing with a very constant longitudinally ovate spot in the middle of the inner margin and two parallel curved transverse lines, the space between them usually somewhat darker. — Larva whitish or yellowish grey to brownish grey, the dark shade being occasioned by indistinct, diffuse and always undefined brownish or reddish spots. The incisions sometimes also dark. Humps on segments 3, 5 and 8 brown. On segment 2 two black-brown spots connected by a white transverse line and with white posterior edges, in each of which stand two light red spots at the ends of the white transverse line. The larvae feed on the leaves of the white mulberry (Morus alba), but will also take Scorzonera. The circular and rather flat eggs are first dark yellow, later grey; they hibernate. The pupa is light brown, the cocoon greyish white or yellow, varying from light sulphur-yellow with a greyish tinge to dark lemon-yellow, in the ♀ regularly oval, in the ♂ slightly constricted in the middle, having nearly the shape of a sand-glass. By giving special food to the larvae cocoons may be obtained which are distinctly green or red. Originally inhabiting India, the silk-moth was very early imported into China and later into Europe, where it is now bred for industrial purposes, especially in Northern Italy and Southern France. In the course of time a large number of varieties have been obtained, which are, however, only domestic races, the result of artificial breeding, and of no systematic value; we figure a grey form in both sexes on plate 35 as *Bombyx mori ab.*, this being known in the trade as fa. *brunnea Bang-Haas* *mori.*

i. l. These races differ one from another in the size or in the length of life of the larvae, the number of changes of skin (3 to 4), size and colour of the cocoon. A few races have two broods yearly, but normally there is only one.

2. Genus: **Theophila** *Moore.*

Closely allied to *Bombyx*. Antennae and body as in that genus. Palpi absent. Shape of wing similar to *Bombyx*, with the same deep round sinus below the apex of the forewing, which is strongly convex at the costal margin, but the distal margin sometimes somewhat wavy. Vein 5 of both wings originates before the middle of the discocellular vein, this straight in both wings, vertical in the forewing and directed obliquely distad and anad in the hindwing so that the lower angle of the cell is acute. Venation otherwise as in *Bombyx*.

mandarina. **Th. mandarina** *Moore* (35 e). Body and wings with olive-brown ground-colour, forewing somewhat lighter, more suffused with grey, in the arrangement of the markings resembling *Bombyx mori*, but the dark bands rather diffuse. Apex and anterior half of distal margin occupied by a deep black brown spot which is only divided from the narrow submarginal line by a narrow light grey interspace. Hindwing above uniformly brown, only at the inner margin with a black-brown spot sharply edged with white, beneath with two prominent curved median lines. Forewing with broad scales branched like down, giving the wing a particularly soft *fuscata.* appearance. Eastern China, Corea and Japan. — **fuscata** *Motsch.*, from Japan, appears to be only a dark form of *mandarina* according to the description.

3. Genus: **Andraca** *Walk.*

Branches of antennae much shortened towards the apex. Palpi small, porrect. Forewing with sharp produced apex, distal margin slightly concave in its costal half, and angulate at vein 4. Inner margin of hindwing deeply concave. In the forewing veins 3 and 4 from the lower angle of the cell, and 6 from the upper, 7, 8, 9 and 10 stalked. In the hindwing veins 6 and 7 from the upper angle of the cell, 8 connected with the cell by a short transverse vein near the base. Besides a South-Asiatic species only one other is known, said to be from Japan.

gracilis. **A. gracilis** *Butl.* Forewing reddish brown with sharp black discal spot and three blackish dentate bands: a subbasal, discal and a submarginal one. Hindwing brownish yellow at the costal margin, reddish near the inner margin, with a small dark discal spot. Body above reddish brown, beneath bright light golden brown. Is said to occur in Japan; but the newer catalogues do not mention it in this genus as coming from there, so that its occurrence in the Palearctic Region requires confirmation.

4. Genus: **Oberthueria** *Stgr.*

Antennae only strongly serrate in the apical third. Palpi relatively large, extending slightly beyond the frons, somewhat upturned and pointed. Distal margin of forewing with a pointed tooth at vein 4, the distal margin of hindwing also strongly projecting at vein 3 and slightly wavy at the other veins. In the forewing vein 10 is absent, in the hindwing vein 8 touches the cell at a point close beyond the base; veins otherwise essentially as in *Bombyx*. Only one species of this genus as yet known. Amurland and Japan.

caeca. **O. caeca** *Oberth.* (35 e). Brownish yellow, forewing with black discal spot and three irregular black transverse bands: one subbasal, another discal and a third submarginal; the two last also traverse the whole breadth of the hindwing. In the forewing, moreover, an elongate brown marginal spot. Ussuri district. The *rutilans.* Japanese form, which we name ab. **rutilans** *ab. nov.*, is dull brownish red, the body dull, the wings slightly glossy; the dark markings are less distinct than in the continental form and the extended marginal spot of the forewing is less distinct. The underside is light rust-coloured with sharp black discal dot and equally sharp discal and submarginal band. Japan.

5. Genus: **Mustilia** *Walk.*

Antennae with long pectinations only in the basal half, the distal half with quite short teeth. Tongue short but fairly broad. Frons smoothly hairy. Forewing with elongate sickle-shaped apex, distal margin deeply concave, entire and merging into the almost straight hind margin in a broad curve. Hindwing broad but also rather elongate, costal and anal angles rounded, but distinct. distal margin entire, projecting most strongly at vein 3. Vein 2 of forewing from the middle of the cell, 3 and 4 widely separated, 5 in front of the middle of the discocellular vein, 6, 7, 8, 9 and 10 stalked, 6 close below and 11 close before the upper angle of the cell, 8, 9, 10 and 11 running close along the costal margin. In the hindwing veins 2 to 5 as in the forewing, 6 and 7 close together from the upper angle of the cell, 8 connected with the cell by a short transverse vein near the base. Discocellular vein of forewing with sharp angle below the middle, in the hindwing with rectangular bend before the centre. The genus belongs to the Oriental Region and occurs especially in Northern India. Only one species concerns us here.

falcipennis. **M. falcipennis** *Walk.* (29 e). Frons and collar bright golden brown, vertex, dorsum of thorax and base of abdomen whitish, hind margin of thorax indicated by a dark brown transverse band. Abdomen brown. Ground-colour of forewing reddish brown, but numerous white hair-scales lend it a grey tinge; a blackish discal spot at the apex of the cell; a subbasal, a discal and a submarginal transverse line, dark brown and sharply broken in the costal half, the outer one uniting with a black streak coming from the apex. Between the streak and the distal margin an extended dark brown spot reaching the apex of vein 2. Hindwing brownish yellow with dark brown continuous postdiscal line, inner marginal area brown slightly tinged with grey, a dark brown spot in the middle of the inner margin. Underside of body and wings bright golden brown, both wings with a sharp discal spot and sharp submarginal line. Widely distributed in the Himalayas, and extending in the North-West into the Palearctic Region.

6. Genus: **Rondotia** *Moore.*

Antennae with moderately long pectinations; palpi small, inconspicuous. Wings broad, apical half of costal margin strongly curved, distal margin strongly concave below the pointed apex, angulate at vein 4, then straight, distinctly separated from the likewise straight inner margin. Hindwing with straight costal and inner margins, distal margin moderately curved, slightly dentate at the veins, somewhat more so at vein 4, concave between veins 2 and 1 b. In the forewing veins 3 and 4 from the lower angle of the cell, 6, 7, 8, 9, 10 and 11 on a common stalk from the upper angle; in the hindwing veins 3 and 4 from the hind angle, 6 and 7 stalked. Two of the three brown species of the genus are East-Asiatic, the third occurring in Southern Asia.

R. menciana *Moore* (30 b). Quite uniformly vivid deep yellow, the edges of the wings with a more brownish tinge. Forewing with sharp black discal streak, and two likewise distinct narrow lunate lines traversing the whole wing, a subbasal and a postdiscal one. Hindwing with narrow discal streak and two black innermarginal spots, the distal margin blackened at the anal angle; this is not the case in ab. **lurida** *Fixs.* Central and Eastern China, Corea. *menciana.* *lurida.*

R. lineata *Leech.* Yellowish white, markings of forewing resembling those of *menciana.* At the apex an extended black spot bounded by the postdiscal line on the inner side and reaching to below vein 4 along the distal margin. Hindwing with black postdiscal lunate line beginning at the outer black innermarginal spot and ending before the costal margin. Nearer the base a second innermarginal spot. West China. *lineata.*

7. Genus: **Ocinera** *Walk.*

Rather small species with broad entire wings whose margins are only slightly dentate at the veins. Palpi short, being mere inconspicuous remnants. Forewing triangular, with broadly rounded or slightly pointed apex. Costal margin quite straight to near the apex, distal margin only slightly convex, inner margin straight. In the forewing vein 5 from the slightly angulate middle of the discocellular vein, 6 from the upper angle of the cell, 7, 8, 9 and 10 stalked; in the hindwing 3 and 4 from a point or on a short stalk from the lower angle of the cell, 5 from the centre of the strongly oblique discocellular vein, 6 and 7 stalked, 8 free from the base.

O. signifera *Walk.* (= lactea *Hutt.*) (35 f). White, wings thinly scaled, and strongly irridescent, with black, often strongly reduced, markings. Both wings with dark postmedian lunate line, forewing with a few black costal marginal spots and one or two discal ones, hindwing with three very constant inner marginal spots, as well as beneath with a black discal spot. Southern Asia, from the North-West Himalayas to the Sunda Islands. — Larva brown with a hump on segments 2, 4 and 7 as well as a horn on 10. *signifera.*

O. apicalis *Walk.* (= signata *Walk.*, moorei *Hutt.*, lida *Moore*) (30 f). Similar to *signifera*, with white ground-colour, but suffused with greyish brown, the postmedian lunate lines more distinct, there being also diffuse submarginal spots of the same colour. Costal marginal and discal spots of forewing usually indistinct, but the inner marginal spots of hindwing sharp. From China throughout Southern Asia to Java. — Larva similar to that of *signifera*, but with short hair, on segment 2 a short tuft of hair, before it a black spot. According to A. Seitz the moth when at rest affects a very curious position; viz., it rests on the surface of a leaf with the head leaning on the leaf and the abdomen curved upwards; the wings are at the same time spread out laterally so that the insect looks more like a small white feather than a moth. *apicalis.*

O. varians *Walk.* (= velata *Walk.*) (30 f). Considerably smaller than the two preceding species, varying from light brown, sometimes with a greyish or whitish tinge, to rather dark reddish brown. Forewing with two antemedian and two postmedian minutely dentate parallel lunulate lines, beside the dark discal spot; a dark spot at the anterior half of the distal margin. Hindwing unicolorous with three dark brown innermarginal spots edged with white. Distributed from China and Formosa throughout Southern Asia to the Sunda Islands *varians.*

and Philippines. — Larva slender, brown, with dark spots and a row of black lateral spots. A hump on the thoracical segments and on segments 2 and 5 of the abdomen, the horn on 11 long and slender. Pupa in a very loose, pale, oval cocoon with a silky gloss.

8. Genus: **Dalailama** *Stgr.*

Antennae pectinate to beyond the middle, serrate towards the apex. Palpi very small, inconspicuous. Forewing elongate-triangular, with pointed and rather produced apex, distal margin only slightly curved, not sinuate, forming a distinct angle with the nearly straight inner margin. Hindwing broad, apical and anal angles distinct, distal and inner margins straight. In the forewing vein 4 from the lower angle of the cell, 3 close before it, 5 from the middle angle of the discocellular vein, 6 from the upper angle of the cell, 7, 8, 9 and 10 (presumably!) stalked. In the hindwing vein 6 and the stalk of 7 and 8 (according to Staudinger) from the anterior angle of the cell. Middle and hind tibiae with short end-spurs. A very peculiar genus whose position among the true *Bombycidae* is somewhat doubtful, the scheme of markings also not well agreeing with the present family. The genus requires careful re-examination. As yet only one Central Asiatic species known.

bifurca. **D. bifurca** *Stgr.* (30 b). Ground-colour brownish to violet-grey, both wings having a black discal spot edged with white and a postmedian dark brown transverse band; this is bounded on the outside by a white transverse band forked in the costal half, its outer and more distinct branch running into the apex of the wing. Apex and distal marginal area occupied by an extended dark brown marginal spot reaching on the forewing to vein 3, in the hindwing occupying the whole marginal area. Forewing also with a dark brown subbasal band broken in its costal half. Tibet.

Alphabetical List

of the Palearctic forms of *Bombycidae* with a reference to the original descriptions.

* signifies that the form is also figured at the place quoted.

apicalis Oc. *Walk.* Journ. Linn. Soc. 6, p. 130.
bifurca Dal. *Stgr.* Iris 8, p. 303 *.
caeca Ob. *Oberth.* Ét. d'Ent. 5, p. 40 *.
falcipennis Must. *Walk.* Cat. Lep. Het. B. M. 32, p. 581.
fuscata Theoph. *Moltsch.* Bull. Soc. Mosc. 39, p. 197.
gracilis And. *Bull.* Cist. Ent. 3, p. 125.
lineata Rond. *Leech*, Trans. Ent. Soc. Lond. 1889, p. 272.
mandarina Theoph. *Moore*, Proc. Zool. Soc. Lond. 1872, p. 576 *.
menciane Rond. *Moore*, Ann. Mag. Nat. Hist. (5) 15, p. 110.
meri Bomb. *L.* Syst. Nat. 1758, (1), p. 499.
signifera Oc. *Walk.* Journ. Linn. Soc. Lond. 6, p. 130.
varians Oc. *Walk.* Cat. Lep. Het. B. M. 5, p. 1153.

Publ. 5. X. 1911.

11. Family: Endromididæ.

This family really only contains one Palearctic moth, *Endromis versicolora*, which is undoubtedly allied to the Saturnids and Bombycids. The position which STAUDINGER and REBEL assign to it in their catalogue between the Lasiocampids and the genus *Lemonia* is not well chosen, but these authors place at the end of the Lasiocampids the strongly aberrant genus *Bhima* (= *Pyrosis*), as we have done also in order to avoid unnecessary changes, and so a kind of bridge is actually formed by this genus, which approaches the Bombycids. KIRBY places *Endromis* between *Theophila*, a genus allied to *Bombyx mori*, and *Brahmaea*, in which he was not far from right, as is evident from the caterpillar of *Endromis*; but he interpolates between these two neighbours numerous American genera which might better be put elsewhere, and thus the connection is lost. *Endromis* has no near relative in America, but if one would prefer to place it with American genera, the best position would be between FELDER's *Hygrochroa* and the *Ceratocampidae*, which latter correspond to a certain extent to the Old World *Brahmaea*, as will be shown under this genus. However, HAMPSON deals with *Endromis* in a very different manner, placing it with the Lasiocampids, which he regards as a branch of the phylogenetic tree far removed from the Saturnid branch.

We place into this family also a species of moths which stands rather isolated if one takes it from its present certainly incorrect position, viz., *Mirina christophi Stgr.* It has nothing to do with the Saturnids and cannot possibly remain there. It is also not closely allied to *Brahmaea*. But we do not intend here to found a new classification, or to criticise existing schemes. It therefore suffices to say that *Mirina* is not a Saturnid, stands somewhat isolated and is most closely related to that group of Bombyces which comprises the *Endromididae*, the *Bombycidae* and the Lasiocampid genus *Bhima* (= *Pyrosis*), which is closely related to the Bombyces.

Resembling the Bombycids in the shape of the wings and in facies. The wings with produced, somewhat falcate apex; the hindwing with very moderately convex outer margin. The venation agrees very nearly with that of the neighbouring families *Drepanidae* and *Bombycidae*. On the forewing vein 5 originates closer to 4 than 6, on the hindwing 8 is curved and approaches 7. The frenulum is absent as in *Brahmaea* and *Bombycidae*. When full-grown the larva is naked, green, smooth, with a hump on segment 11, and lateral oblique stripes, so that it bears a (superficial) resemblance to the larva of *Sphingidae*; when young the caterpillar has thorns, which are moveable in *Mirina*. This similarity to the *Sphingidae*, however, is only due to convergent development; the green smooth appearance is protective colouring; the oblique stripes imitate the veins of leaves and run in a contrary direction to those of most larvae of *Sphingidae*. The moths are on the wing in the early spring, the pupa often lies for years before developing.

1. Genus: **Endromis** *O.*

Moths clothed with dense long hair, and having thinly scaled checkered wings. Tongue obsolescent; palpi short, hidden in the wool of the head. Antennae bipectinate, the branches long in the ♂. Legs strong, clothed with woolly hair. Forewing pointed, with strongly curved distal margin. Larva green with a pyramid-like hump on the penultimate segment; it is full-grown in June, and pupates in a parchment-like cocoon.

E. versicolora *L.* (= versicolor *L.*, versicoloria *Hfngl.*) (35 d). Antennae black; collar white, suffused with blackish; wings checkered with brown, ground-colour of the hindwing ochreous in the ♂, whitish in the ♀. Sometimes the spots of the forewing are suffused with reddish in the ♀; in specimens from the high North the ground-colour is dulled and the entire colouring darker; this is **lapponica** *Bau.* Egg oval, rose red. Larva when young black and bristly, later green, dorsally lightest, with minute white transverse wrinkles. The three anterior segments with lateral lines, the others with white oblique stripes edged with green. But while the oblique stripes of the *Sphingidae* run from posteriorly above to anteriorly below, they are here directed from anteriorly above to posteriorly below. The larva lives from May to July on Birch, Alder, Hazel, Hornbeam, and other shrubs, more on bushes and suckers than on the higher branches. It pupates on or in the ground, in a parchment-like cocoon. Pupa black with bristly curved cremaster. Like most of the early spring-moths it often hibernates twice or several times, the moth appearing in Central Europe in the second half of March or in April. The ♂ leaves the cocoon in the morning and until 10.30 remains with the wings folded close to the body on tree-trunks and branches, seldom on old halms of grass. Then it takes to the wing, the flight being rapid and buzzing. The ♀ flies at night. The species is widely distributed, being absent from scarcely any large area, and in certain years not rare. Central and Northern Europe, northward to Lapland, southward to Northern Italy, and from France to Eastern Siberia. As in some other species the moth flies considerably later in Amurland than in Central Europe, in May. *versicolora.* *lapponica.*

2. Genus: **Mirina** *Stgr.*

STAUDINGER described the only species of this genus as rather isolated, and placed it with the Saturnids, next to the *Endromididae*. It is, however, certainly less closely allied with the former than with the latter family, so that we leave it with *Endromis*, in order to avoid a radical change in its position, which is outside the scope of this work, while at the same time we emphasize that *Mirina* cannot naturally be united with any of the families adopted in classification. According to Staudinger there is also no close affinity to exotic genera. The moth is moderately small, strongly hairy, thinly scaled, the antennae bipectinate, with rather long pectinations in ♂ and ♀; head and thorax with woolly hair, patagia with stronger hairs at the edge, legs strong, abdomen in the ♂ somewhat stumpy posteriorly, in the ♀ moderately stout. Wings with entire margins, forewing without produced apex and without curved outer margin, ground-colour light with dark median spot. The larva black when young, with moveable thorns, later on green; the pupa hibernates, producing the moth in the spring. One East-Asiatic species.

christophi. **M. christophi** *Stgr.* (35d). Moth almost alike in both sexes, whitish with grey and golden-brown markings. At once recognisable by the large dark distally concave cell-spot on the forewing, below which there is a greyish yellow cloud, and behind which is a tiny black dot. Larva when young black with a dentate brown longitudinal lateral mark; the tentacles on the anterior segments nearly attain the length of the body and are slightly curved at the tip; when the larva is at rest reposing curved in a half-circle on the surface of a leaf, the thorns are lying forward flat on the body, but are at once raised when the insect is disturbed, the larva throwing the forepart of its body wildly from side to side. Later on the darker colour disappears, the larva becoming green; at this stage it remains concealed in daytime among the foliage. When disturbed long bluish green processes appear laterally above the legs on segments 5 to 9, similar to the fleshy fork of the larvae of *Papilio* (Graeser). Larva from June onward on Lonicera, moth in the spring. In the Ussuri district, Amurland, not rare, as Graeser collected 160 pupae in one year.

Alphabetical List

of the Palearctic forms of *Endromididae* with a reference to the original descriptions.

* signifies that the form is also figured at the place cited.

christophi M. *Stgr.* Rom. Mém. Lép. 3, p. 312.
lapponica E. *Bau*, Stett. Zg. 1877, p 152.
versicolora E. *L.* Syst. Nat. (X) p. 499.

12. Family: Drepanidæ.

Usually small broad-winged moths, resembling Geometers. Antennae short, as a rule not half so long as the forewing, usually bipectinate in both sexes (but the pectinations of the ♀ much shorter). Head broad, smoothly scaled. Eyes naked. Palpi of true *Drepanidae* (*Drepaninae*) short or even absent, sparsely scaled. Tongue short or absent. Body slender. Wings broad, when at rest folded in roof-shape. Forewing usually with falcate produced apex, vein 1 b forked at the base, 1 c absent, 3 subcostal veins or only two stalked, but in the latter case an areole present; 5 originates nearer to 4 than to 6. Cell closed. In the hindwing vein 8 approaches vein 7 in the middle, and sometimes (*Cilix*, *Deroca*, etc.) anastomoses with it. Only one or two dorsal veins and usually the frenulum present. Discocellular vein angulate.

Egg rounded, oval. Larva slender, covered with single slender hairs; fourteen feet (8 propedes), the anal claspers being modified to a single anal pointed process, rarely with 16 feet (10 propedes, *Eucherinae*); the anterior segments often with fleshy excrescences in pairs, the head indented at the vertex, sometimes with two points. On deciduous trees, and pupating between leaves spun together. Pupa a mummy, slender, hard, often with a bloom, hibernating in a thin silky cocoon. Usually two broods, in the North only one.

According to prevalent opinions the *Thyrididae* must be considered as being among the families related with the Drepanids the one which comes nearest to them. It is indeed very difficult to give any differences which hold good in all cases. — In the Drepanids vein 1 a of the hindwing is as a rule entirely absent or very short, while in the Thyridids it reaches the anal angle. That is the rule; but there are Drepanids, e. g. *Leucodrepana idaeoides* (and also other *Leucodrepana*?) and *Cilix*, in which 1 a is present and reaches the anal angle or almost. The Drepanids are best distinguished from the Thyridids by the presence of three stalked subcostal veins or two such and an areole, as the Thyridids never have an areole and at most two (sometimes not even one!) stalked subcostal vein. Moreover, the facies, especially in the markings of the Thyridids, is so characteristic that they can in most cases be recognised by that alone. The larvae are different, those of the Thyridids being „Microlepidoptera", and those of the Drepanids „Macrolepidoptera", the relationship of the two groups being therefore actually not very close. Many Drepanids resemble Geometers, but the families are distinguished inter alia by vein 5 originating in the middle of the discocellular or nearer 6 than 4 in the Geometers, while in the Drepanids it originates nearer 4 than 6. However, there are transitional forms which will perhaps have to be placed into the other family when the larvae have become known (e. g., *Macrocilix*).

I propose dividing the *Drepanidae* into two subfamilies, *Eucherinae* and *Drepaninae*.

1. Subfamily: **Eucherinae** *subfam. nov.*

Vein 1 a of the forewing anastomoses with 1 b in the middle and terminates without reaching the inner margin or anal angle (recalling the Papilionids). Palpi long, stout, upright. Vein 1 a of hindwing present and fairly long. Vein 5 of forewing nearly in the middle between 4 and 6. — The presence of 10 propedes in the larvae, which have therefore 16 feet, is especially important.

Only one genus (perhaps *Mimozethes* also belongs here).

1. Genus: **Euchera** *Hbn.*

The largest Drepanids of our area belong to this genus. Usually broad-winged moths with grey or whitish markings, already distinguished by their colour from the mostly uniformly brownish and yellowish smaller forms. The antennae are characteristically stout and laminate. Palpi upturned. Middle tibiae with one pair of spurs, hind tibiae with two. Veins 1 a and 1 b of forewing forming a fork as in the other *Drepanidae*, but in contradistinction to the other genera a short branch directed backward and outward originates at this fork and terminates in the wing before reaching the margin. Discocellular of both wings only slightly angulate. Vein 5 of forewing rather far from the angle of the cell, 6 slightly below the upper angle. The moths rest like the Geometers on the underside of large leaves in daytime, and are flushed by beating or caught at the lamp in the evening.

E. substigmaria *Hbn.* (23 f) has black head, white thorax and brownish white abdomen. There is a straight line from the apex of the forewing to the middle of the hind margin of the hindwing, dividing both wings into an outer whitish and an inner darker area; in the latter the somewhat lighter basal area and a light postmedian band in the costal half of the wing are distinguishable as well as a large whitish discocellular spot; in the marginal area a few small, darker, often sharply defined, spots, especially at the anal angle. Hindwing with large rounded deep black discocellular spot. 68 to 82 mm. — Larva black with lighter ringed *substigmaria.*

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*) In our work the Thyridids, of which only 20 forms are known from the Palearctic Region, are placed next to the *Sesiidae*, which also bear a close affinity to the Microlepidoptera.

head and anal segment, a sublateral white line and rows of white and yellow transverse bars at the sides; 10 pedes spurii. Widely distributed in India, also in Kashmir; and in Northern China.

capitata. **E. capitata** *Walk.* (23 f), from China, Japan and Corea, is said to be a very variable species. Ground-colour white, head, palpi and antennae black, abdomen grey with white hind margins to the segments and with white apex. Wings with very broad grey median band diffuse in the middle of the costal area of the forewing, widened in the middle of the hindwing and almost interrupted anteriorly; and with another grey distal band strongly narrowed especially in the middle, and on the forewing strongly widened costally; a row of blackish submarginal spots indistinctly connected with each other; discocellular spot of forewing white; the forewing bears two indistinct dentate dark bands in the basal area. ♀ 60 to 70 mm. — Most easily distinguished from *substigmaria* by the absence of a deep black discocellular spot on the upperside of the hindwing, while below there is an obsolescent blackish discocellular spot on both wings (in *substigmaria* this is deep black and sharply defined).

orciferaria. **E. orciferaria** *Walk.* (= ociferaria *aut.*) (48 a), from Northern China, is brownish black, lighter beneath, wings distally with three dentate purplish grey lines close together, a similar inner line being indicated, otherwise the wings bear irregular and indistinct darker irrorations and are grey in the outer third of the underside. Forewing more elongate and more falcate at the apex than in *substigmaria*, and the margin more oblique, while the hindwing is distally more rounded than in the latter species. ♀ 72 mm.

fractifasciata. **E. fractifasciata** *Leech* (48 a), from Western China, is white, forewing with dark spot and band in the basal area, interrupted median band enclosing a white spot in the costal area and represented in the hindmarginal area by two round spots, and with a dark marginal area as well as darker wavy lines. Hindwing with interrupted dark submarginal band and a row of dark spots in the marginal area. ♂ 80, ♀ 90 mm.

dictyaria. **E. dictyaria** *Swinh.*, from Kangra in Kashmir, is pure white above and below, forewing without any transverse markings, but with a discal spot below shining through, and hindwing with large black similar spot, both wings with sharply marked round black submarginal spots. Vertex black. ♀ 66 to 67 mm.

fabiolaria. **E. fabiolaria** *Oberth.* (23 f), from Tibet, is perhaps not a Drepanid at all, but a Geometrid. Wings milky white with grey-brown spots indefinitely bounded and not regularly arranged, which in the forewing above are especially prominent in the basal area, the middle of the costal area, and as a submarginal band broadly interrupted in the middle, while in the hindwing there are in the innermarginal half a median and a submarginal band dark, besides a dull dark submarginal transverse spot in the middle of the marginal area. Body yellowish, abdomen with black spots. 51 mm.

2. Subfamily: **Drepaninae** *subfam. nov.*

Vein 1 a of forewing forked with 1 b, not ending free. Palpi small or even absent; vein 1 a of hindwing may be present or absent; vein 5 of forewing on the whole distinctly below the centre between 4 and 6. Larvae with 14 feet (8 propedes). Falls into two groups.

A. Proboscis and frenulum present (genera 2 to 10).

2. Genus: **Mimozethes** *Warr.*

The species for which this genus was afterwards erected was originally described by Warren as a doubtful *Euchera*, while Leech had described it a few months earlier as an Epiplemid. — The genus seems to differ from *Euchera* in the following particulars: costa of forewing strongly curved at the base, then straight, hindwing broadly rounded at both angles. Palpi porrect. Vein 5 of forewing from the middle of the discocellular, antennae shortly unipectinate. Unknown to me.

argentilineraria. **M. argentilinearia** *Leech* (= nana *Warr.*) (48 a). Forewing bronze-brown, with light mauve-grey, sharply angulate transverse lines, two near the base, two at one-third, a fifth beyond the centre and two further lines submarginal; fringes purple with white tips. Hindwing more purple, with 6 or 7 light wavy lines which do not reach the costal margin and the outer one of which is denticulate, a light marginal band with darker spots. Both sexes 32 mm. — Japan.

3. Genus: **Macrocilix** *Butl.*

Medium-sized, predominantly white moths with very small palpi, rounded apex of forewing and angulate discocellular; veins 7, 8 and 9 stalked, 6 originating below the upper angle of the cell; antennae of ♂ with long pectinations, of ♀ with short ones (in *M. mysticata*). Areole present or not. — Swinhoe has erected a new genus *Sewa* for *orbiferata*.

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*) *Euchera agnes Butl.*, in Ann. Mag. Nat. Hist. (5) 1, p. 111, from Japan, is a Geometrid.

M. mysticata *Walk.* (23 f) is white, back of thorax and abdomen reddish yellow; wings semitransparent, forewing with a somewhat irregular golden-brown postmedian transverse band, which encloses white stripes, and with a dark submarginal interrupted band. Hindwing with similar markings, but the submedian band is prolonged basad at the inner margin and less so distad, being distally marked posteriorly with silvery scales and black spots; at the anal angle a yellow smear spotted with black. 42 mm. — Kashmir, also in Sikkim. *mysticata.*

M. maia *Leech* (23 f), from Corea and Kiushiu, has white wings; the forewing with a large pear-shaped lead-grey transverse spot shortly beyond the centre, which reaches the inner margin but not the distal one; the hindwing rust-reddish and silvery greyish along the inner margin and in a large irregular spot in the anal area. Body whitish, thorax and abdomen reddish grey above. 48 mm. *maia.*

M. orbiferata *Walk.* (= insignata *Moore*) (23 g). White; antennae ochreous; forewing with three transverse dark stripes or bands, the postmedian one being broadest, interrupted before the middle and enclosing a white stripe in the middle of the hinder half, while the submarginal one is separated into spots; costal margin with 5 spots. Hindwing with postmedian band, interrupted costally, widened behind and pencilled with white, and with a yellow smear striped and spotted with a darker colour at the anal angle. Underside white with four dark spots. Forewing below in the marginal area with black K-shaped mark. 27 mm. — Western China, also widely distributed in India, Borneo, Java; the form from Java (*cilicoides Snell.*) is perhaps a different species. *orbiferata.*

4. Genus: **Macrauzata** *Butl.*

The forewing bears large vitreous spots and the apex is prolonged, recurved and rather pointed; discocellular of both wings sharply angulate; in the forewing vein 6 originates at the upper angle of the cell, while 7, 8, 9 and 10 are stalked and originate shortly before the anterior angle of the cell. Palpi very small. Antennae of ♀ with short pectinations, of ♂ with longer ones. Middle and hind tibiae with very short end-spurs.

M. fenestraria *Moore* (23 f) is yellowish white, on the forewing with a large rounded vitreous spot rather angulate posteriorly and interrupted by the yellowish veins, a reddish yellow double oblique stripe runs transversely across the wing at the proximal edge of the glassy spot, and a similar stripe surrounds the vitreous spot anteriorly and distally. Hindwing similar, but the hyaline spot smaller and more irregular, almost divided into 6 spots. 45 to 66 mm. Japan; Kangra in Kashmir; also elsewhere in India. *fenestraria.*

5. Genus: **Auzata** *Walk.*

Forewing with pointed apex, distal margin angulate at vein 3; the hindwing is also and even more distinctly angled at the same place. Vein 6 of the forewing originates slightly below the upper angle of the cell, 7, 8, 9 and 10 are stalked and originate at the upper angle. Antennae somewhat thickened and flattened. Palpi small and upturned. The moths are on the wing at night, by day they are beaten from overhanging branches of trees, from which the jar brings them down fluttering to the ground.

A. semipavonaria *Walk.* (23 g) is white. Forewing with two indistinct brownish yellow or darker antemedian lines, two similar postmedian lines which traverse a pointed pear-shaped or nearly comma-shaped spot, which posteriorly at the commencement of its narrower portion encloses a deep black spot with a silvery blue centre; also with a similar marginal and a submarginal line partly separated into spots. Hindwing with three similar pairs of lines, the marginal one of which is darker than those of the forewing; the comma-shaped spot absent or only indicated. ♂ 42, ♀ 50 mm. — Kashmir, also distributed elsewhere in India. *semipavonaria.*

A. superba *Butl.* (23 g) is likewise white; forewing at the costal margin with darker base and two dark spots, a dark innermarginal spot and 6 to 8 greyish spots in the marginal area, as well as a pear-shaped spot between the innermarginal area and vein 5, similar to that of the preceding species; this spot is olive-greyish yellow, and encloses three white lines dotted with black. Hindwing with a postmedian olive-greyish double oblique band, an interrupted row of submarginal spots of the same colour and similar spots at the inner margin of the basal area. 34 mm. — Japan (Yokohama, Yesso). *superba.*

A. chinensis *Leech* (48 a), from Western China, resembles *superba*, but both wings have a double light brown antemedian line and a similar interrupted submarginal line; hindwing with brown spot. Fringes of both wings checkered with light brown and white. ♂ 38, ♀ 48 mm. *chinensis.*

A. minuta *Leech*, which inhabits Central and Western China, is white; forewing with dark discocellular spot and outside it a dark line which is angulate near the costal margin, but curved posteriorly; in this bend is a dark spot traversed by the white veins; moreover, a dark submarginal band interrupted anteriorly. Hindwing with double median line, a submarginal band and two small spots, all dark. The dark fringes white at the veins. ♂ 25, ♀ 28 to 30 mm. *minuta.*

6. Genus: **Callicilix** *Butl.*

Shape and venation as in *Auzata*, but the antennae pectinate and ending in a point; palpi thinner, upright and longer than in *Auzata*. The genus stands between *Auzata* and *Macrocilix* (according to Butler). Unknown to me in nature.

abraxata. **C. abraxata** *Butl.*, from Japan, resembles an *Abraxas*. Silvery white with greyish brown marginal spots and submarginal band (more or less separated into spots); forewing with a large and irregular median area, greyish brown in the costal portion, but golden brown beyond the subcostal vein, with pearly grey veins and with a light sinuous transverse line proximally; also three greyish brown spots in the basal area. Hindwing with a large transverse band from the middle of the inner margin almost to the costa, interrupted anteriorly, as well as with four pearly white discal spots between the submedian and radial veins. Below the markings are more confluent and the costal area is golden brownish. Head black, thorax whitish, abdomen yellowish. *nguldoe.* Up to 44 mm. — **nguldoe** *Oberth.* (23 g), from China, is larger, with broader and heavier markings; the four white discal spots of the hindwing seem to be absent, two white, lighter, transverse lines are present in the brown median area of the forewing; the abdomen seems to be grey above with a lighter median belt, and whitish below.

7. Genus: **Teldenia** *Moore.*

Forewing with a long areole formed by veins 8 and 9 anastomosing, 6, 7 and 10 originate from the areole. Apex rather pointed. Antennae with long pectinations in the ♂, ciliate in the ♀. End-spur present on the middle and hind tibiae. Palpi long and slender, upturned. — Larva (probably of the Indian *vestigiata Butl.*) is distinguished by a long pointed process on segment 11 directed backward, and a smaller one, stylet-like, on segment 3, as well as dorsal humps on segments 1 and 11.

sericea. **T. sericea** *Leech* (48 a), from Western China, is silky white, forewing with four dark wavy transverse lines, the two outer ones of which are submarginal and close together. Hindwing with three similar lines. 20 to 30 mm. The species superficially resembles a pale-marked specimen of *Deilinia pusaria L.*

inconspicua. **T. inconspicua** *Leech* (48 a) is silky white, with strongly undulate transverse dark lines, which are most distinct in the marginal area of the wing. Underside white, costal area brownish. 32 mm. — Western China.

8. Genus: **Leucodrepana** *Hamps.*

Forewing with slightly pointed apex and strongly oblique distal margin; areole present, being formed by 8, 9 and 10 anastomosing; 7 from the apex of the areole, 11 from the cell. Antennae of both sexes widened and flattened. Middle tibia with one, hind tibia with two pairs of spurs. Palpi porrect. — In *L. idaeoides Hamps.*, according to the figure in Hampson, Fauna of Brit. India, Moths. I, p. 333, vein 1 a of the hindwing seems to be present and very long, about reaching the anal angle. This character, which might even render it doubtful whether *Leucodrepana* is a Drepanid or a Thyridid, particularly distinguishes *Leucodrepana* from the following genera. But I do not know whether this character is common to all the species placed under *Leucodrepana*, as they are unfortunately all unknown to me in nature; in Hampson's diagnosis of the genus nothing is said about this. But as vein 1 a is developed as described above in *L. idaeoides*, the genotype, this character is to be regarded as essential for the genus, and if there should be species under *Leucodrepana* which do not possess this character, they must be separated as a special genus (*Leucodrepanilla* nom. nov.).

idaeoides. **L. idaeoides** *Hamps.* (48 a). Pure white, an indistinct brown subbasal line in the forewing, both wings with two oblique antemedian wavy lines and two postmedian similar ones, which are angulate near the costal margin of the forewing, but curved near the inner margin of the hindwing. Also a submarginal wavy line and a straight marginal one. 33 mm. — Western China, Sikkim.

sacra. **L. sacra** *Butl.* (48 b). White. Both wing with sharply marked black discocellular spot. Forewing with ochreous transverse lines, the inner one of which is angulate, the outer slightly zigzag; hindwing with only one wavy discal line. Underside without lines. Body creamy yellow. Pectinations of antennae ochreous. 35 mm. — Japan, Corea, Central and Western China.

virgo. **L. virgo** *Butl.* (48 b) is silvery white with minute black marginal dots at the veins and a small brown discocellular spot. Antennae light ochreous. Underside pearl-coloured, legs slightly yellowish. 33 mm. — Yokohama.

nivea. **L. nivea** *Hamps.* (48 b) is distinguished from *idaeoides* by the less glossy white colouring. Forewing without subbasal line; the first pair of lines more oblique, in the outer marginal area three wavy equidistant lines. 31 mm. — Western China, Sikkim.

thibetaria. **L. thibetaria** *Pouj.* Silky white, forewing with 5 narrow straight subparallel dark oblique lines from the inner margin nearly to the costal margin, the four proximal ones arranged in pairs, the three outer ones directed towards the apex or at least to its immediate neighbourhood. The lines (perhaps only 4) are continued on the hindwing, where they also do not reach the costal margin and are slightly curved. 29 mm. Central and Western China.

quinquelineata. **L. quinquelineata** *Leech* (48 b), from Japan, is white; forewing with 4 wavy ochreous transverse lines, the third and fourth of which are most strongly wavy, the submarginal line indicated by ochreous dots. Hindwing with three ochreous wavy transverse lines, the second and third of which seem to continue the third and fourth of the forewing. Beneath white, forewing darker in the costal area. 30 mm.

lineata. **L. lineata** *Leech* (48 b) is silky white; forewing with 4 dark almost parallel and nearly straight lines, hindwing with 4 dark curved parallel ones; fringes yellowish. Underside silvery white, basal area of forewing brownish. 38 mm. West China.

9. Genus: **Drepana** *Schrank.*

Forewing with more or less sickle-shaped apex. Palpi weak, upturned. Hindwing with veins 7 and 8 separate. In the forewing veins 6 and 11 originate from the cell or from the areole. Antennae of ♂ bipectinate to the apex or almost simple in the last third. Hind tibiae with end-spurs and sometimes with middle ones. The wings folded flat when at rest. On the back of segment 1 of the larva there are usually short fleshy projections. The ♂♂ of many species fly by day, their flight being irregular and pendulating. They are wary and at the approach of an enemy fly up into the air. They rest in bushes and branches of trees, from which they can be beaten.

A. European species *).

falcataria. **D. falcataria** *L.* (= falcula *Schiff.*) (23 g). Forewing brownish yellow, sometimes rather pale, with grey zigzag transverse lines not appearing in the costal area of the hindwing. Discocellular spot of forewing grey, round, traversed by black, two dots above it and somewhat further basad; from the apex of the wing to two-thirds of the hindwing a brownish red transverse stripe. Length of forewing 18 to 20 mm., expanse 38 mm. Central and Northern Europe, up to 66° N. Latitude, Italy, Southern Russia, Bithynia, Siberia, in May and August, in the North in June and July. — A ♂ before me from the former collection of Maassen (now in the Berlin Museum), unfortunately without locality (from Aachen ?), is darker than usual above, with very indistinct and small discocellular spot, also scarcely divided by darker lines; on the underside of both wings the two transverse lines are twice as broad as usual, and also wider apart one from the other, the proximal one crossing the apex of the cell and running through the posterior one of the two discocellular spots, while in the typical form it is often quite distinctly separate from the spot, respectively from the cell. The zigzag line in the marginal area of the hindwing beneath is diffuse. I name this form. ab. **crassistrigaria** *ab. nov.* *crassistrigaria.* — Larva with pairs of thorn-like projections on segments 2 and 3 of thorax and 2 of abdomen; green (venter, sides and legs), or yellowish with brownish red dorsal spots from segment 4 onward and with single longer hairs; segments 2 to 5 with fleshy processes, of which those on segment 4 are smaller. Head yellow with two brownish red transverse bands. 25 to 30 mm. long. On Birch and Alder, in June and September. Pupa with short cremaster and 2 head-cases, yellowish brown with black-brown wing-cases and short bristles. It is easy to collect numbers of the moths by jarring the trees in young plantations of Birch and Adler.

curvatula. **D. curvatula** *Borkh.* (23 h) (= harpagula *Hbn.*, acuta *Butl.*) is in light specimens similar to the preceding species, but is usually a good deal darker; forewing only with two black central spots, the red-brown transverse line from the apex of the wing is distinctly continued on the hindwing; colouring usually violet-brown. Markings and shape of wing as in *falcataria*, but the underside much deeper and more evenly ochreous. Length of forewing 15 to 17 mm. May and August. North and Central Europe, to Central Scandinavia and Southern Finland. Absent in England, but occurs in Japan, Corea, Ussuri district, Amur. — The species has been crossed with the previous one: **rebeli** *Standf.* (23 h) (= *falcataria* ♀ × *curvatula* ♂) and **approximatula** *Apatz* (= *falcataria* ♂ × *curvatula* ♀); *rebeli.* *approximatula.* these two forms are most like *curvatula.* ♂ and ♀ of *rebeli* emerged from the chrysalis at the same time, copulated, and normal-looking eggs were laid, but the larvae died soon after emerging or already in the egg. The sexes of *approximatula* emerged at very different times, the ♂♂ appeared soon after the larvae had pupated in a rolled-up leaf edge, while the ♀-larvae spun the curved edge of the leaf together well, gnawed off the case thus formed so that it feel to the ground, closed up the opening still present and hibernated as pupae. — Larva green with short sparse black-brown hair, brown-black and short fleshy projections in pairs on segments 2 to 4, head with brown and white markings; 25 to 30 mm long. Lives on Alder and Oak, June and September.

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*) some of which also occur in Asia.

The larvae partly or entirely spin together the leaves on which they rest, then eat so much of the leaf as to leave just enough of the shelter for concealing them, and then form another case. Pupa brown, wing-cases blackish; distinguished from that of *falcataria* by the two head-cases being pointed and curved outward. *japonibia.* — Japanese specimens are larger (expanse up to 45 mm) and also frequently lighter in colour: f. **japonibia** *form. nov.* (23 h); such specimens are before me from Nikko (Mus. Berol. and coll. Seitz), and Leech (1898) mentions similar ones from Hakodate and Oiwake. But other Japanese specimens are scarcely distinguishable from European ones.

harpagula. **D. harpagula** *Esp.* (= sicula *Hbn.*) (23 h). Dark fawn-brown, suffused with violet-red; forewing in the centre with three connected grey round spots, the outer one of which is spotted with yellow; the forewing has a very deep sinus below the apex. All wings with two dark dentate transverse lines; from the apex of the forewing a zigzag stripe edged with blackish and running along the margin to the inner angle. Expanse 39 mm. Central Europe, Livonia, Southern Sweden, Northern Italy, Amur, probably as a rule only in one generation, in June, but sometimes also in August. — Larva yellow, on segment 3 with a brown fleshy appendage divided at the tip, the sides, and first three segments also dorsally, marked with violet-brown; vertex produced into two points; anal process long, reddish brown. 25 to 30 mm long. On Birch, Lime and Oak until September. Pupa brown, dusted with whitish.

lacertinaria. **D. lacertinaria** *L.* (= lacertula *Schiff.*) (23 h). Forewing with sinuous margin and less conspicuously produced apex than in the preceding species, leather-yellow pencilled with brown, with two nearly straight dark transverse lines and a black median spot between. Hindwing much paler yellowish, unicolorous. 39 mm. North and Central Europe, to 65° N. Lat., Italy, Amur, Ural, Eastern Siberia. Two broods, in May and July *aestiva.* to August, in the North only in June and July. — The summer form, **aestiva** *Rbl.*, is larger and paler, forewing *scincula.* to 20 mm long (in the main form at most 18 mm). — **scincula** *Hbn.* (= dimidiata *Tengstr.*), from the high *conjuncta.* North, has the forewing strongly dusted with grey. — **conjuncta** *Rbl.* has the two transverse lines only in the innermarginal portion of the forewing; they are confluent below the centre. — Eggs elongate-ovate, yellow, glossy, later grey or red, are laid in rows, and the larvae emerge after 10 days. Larva reddish, spotted with brown, with reddish head and larger wart-like projections on segments 2, 3 and 11; on Alder and Birch, in June and September. 28 mm long. Pupa light brown, strongly dusted with white, in a loose sulphur-yellow cocoon.

binaria. **D. binaria** *Hfn.* (23 h, i). Ochreous reddish, suffused with violet-grey, especially on the forewing. The latter with only slightly produced apex, and two blackish grey spots below the costal margin in the middle between two yellow transverse lines, which are also continued on the hindwing, the latter becoming lighter towards the costal margin. 36 mm. Central Europe, Asia Minor, Armenia, Kurdistan, in two broods, May and *uncinula.* September, rare. — **uncinula** *Borkh.* (= uncula *Hbn.*) (23 i), from Southern Europe and Mauretania, is usually larger (forewing to 21, in the main form 17 mm), paler, suffused with pale greyish violet, and with larger central spot in the forewing. In Portugal, in three broods, in April, June and August, now and again also in *umbratula.* Southern Central Europe. — **umbratula** *Stgr.*, from Northern Italy, is much darker chestnut. — There is a ♀ from Elberfeld before me from the former coll. Maassen which is like the lightest *uncinula* in colour, but beyond the apex of the forewing there is scarcely a trace of darker colour and the specimen is much smaller; length of *liliputaria.* forewing only 13 or 14 mm. I call this form ab. **liliputaria** *form. nov.* — From the south of the Province of Oran in Algeria there is a ♂ before me from coll. Bang-Haas which is most closely allied to *uncinula*, but is at once distinguishable in that the hindwing is of exactly the same greyish violet colour as the forewing. Costal margin of forewing bright yellow. Fringes of forewing for the most part dark, those of the hindwing somewhat lighter. The distal one of the transverse lines of both wings is recognisable, the proximal one very slightly *oranaria.* indicated. Length of forewing 15 mm. This form, perhaps a local variety, may receive the name **oranaria** *form. nov.* (23 i). — Egg oval, greenish white, later on carmine, with longitudinal grooves and a transverse band. Larva 30 mm long, greenish, laterally violet grey or greenish brown, with saddle-shaped yellow spot dorsally on segments 6 to 9 edged with brown and narrowed anteriorly and behind, segment 3 with a fleshy process incised at the apex; at both sides of this a row of white dots. Especially on Oak, also on bushes of Beech and Alder; in June and August. The larva of *unicula* is almost uniformly green, and lives on Quercus ilex.

cultraria. **D. cultraria** *F.* (= sicula *Esp.*, unguicula *Hbn.*) (23 i). Apex of forewing distinctly produced. Bright ochreous, forewing with grey median band with light edges, which is also continued on the lighter hindwing, where it is narrower; on the forewing the band bears an obsolescent grey median dot. 32 to 34 mm. Central Europe, Denmark, Southern Sweden, Northern Italy, Bithynia, Dalmatia, abundant in Beech woods, May *aestiva.* and August. — **aestiva** *Spr.* (= minor *Fuchs*) (23 i), the summer brood, is somewhat smaller (length of forewing 10 to 11 instead of 15 mm), darker, with two more distinct median dots on the forewing. — Larva 30 mm long, light brown with darker median line, whitish lunulate lateral stripe and lighter dorsal saddle-shaped spot. The protuberance on segment 3 is small, only divided at the tip. Head light brown. On Beech, in June and August. Pupa glossy brown, and lies (v. *aestiva*) 10 to 12 days. The ♂♂ fly in the sunshine, especially in the afternoon, but are wary and not easy to catch on account of their oscillating flight, as they go into the air when approached. In many years very abundant, in others more singly.

B. Asiatic species.

crocea. **D. crocea** *Leech* (23 b). Yellow; forewing slightly suffused with reddish, with a subbasal, a central and a submarginal line purple-brown, the last separated into dots, of which those in cellules 4 and 5 and sometimes 6 are enlarged to form two deep black, sharply marked spots with lighter edges. Discocellular spot small, white, with a narrow dark edge, in the hindwing double. The hindwing with but slight markings, the submarginal line only consisting of dots. Apex of wings strongly curved. 43 to 50 mm. — Japan, China.

rubromarginata. **D. rubromarginata** *Leech* (48 b), from West China, has yellow forewing with reddish brown marginal area (between the inner margin and vein 6), an antemedian, a postmedian and a submarginal transverse line blackish, two blackish spots in the cell, and two at the end of the same, the reddish marginal band with a wavy transverse line of the ground-colour. Hindwing lighter, with traces of transverse markings, and a black spot between veins 2 and 3 as well as between 3 and 4. 33 mm. On the wing in June and July.

grisearipennis. **D. grisearipennis** *nom. nov.* (= grisearia *Leech* nec *Stgr.*) (48 c), also from West China, has whitish-hyaline forewing suffused with brownish, with darker basal spot, antemedian, postmedian and median dark bands as well as an elongate black spot on the upper discocellular and two nearly round similar ones on the lower discocellular. Hindwing whitish, with five dark transverse lines and bands, and two dark spots at the apex of the cell. 40 mm. Flies in June or July.

manleyi. **D. manleyi** *Leech* (48 b) is Japanese (Yokohama) and has light ochreous brown forewing with two transverse lines, a black spot in the cell and purple-brown apex; hindwing pale straw-colour, with four brown lines. Underside also pale straw-colour, with brownish apex and on the forewing with brownish postmedian and submarginal lines. 20 to 33 mm.

acuminata. **D. acuminata** *Leech* (48 b). ♂ similar to *D. falcataria*. Light reddish brown; forewing with two dark brown discal transverse lines, the first of which runs first to the median vein, then to the inner margin, while the second runs from the costal margin towards the distal margin, but then curves inwards and runs obliquely to the inner margin; there are also a dark submarginal line and two small black discal dots. Hindwing with two dark brown median lines, the first curved, the other straight, as well as with a dark brown wavy submarginal line. Underside whitish, in the marginal area of the forewing brownish, both wings with black discocellular dot and two dark transverse lines, one of which is submarginal. 39 mm. In July. — Central China.

hyalina. **D. hyalina** *Moore* (48 b). Dirty white, semitransparent. Forewing with two darker wavy antemedian lines and two similar postmedian ones; the distal one of the latter is widened towards the inner margin; further, a submarginal and a marginal row of indistinct dots. Hindwing with an antemedian, two postmedian and a submarginal indistinct wavy dark line. 43 mm. — Kashmir, West China.

japonica. **D. japonica** *Moore* (30 f). Upper side whitish grey; both wings with two narrow yellow brown-edged oblique transverse bands, the distal one of which runs from shortly before the apex of the wing to shortly before the middle of the inner margin, the proximal one from the middle of the costa to one-third of the inner margin; forewing ochreous at the apex and at the costal margin, with very small brown discocellular streak. Costal margin of forewing with two dark spots between the transverse lines. In the marginal area of the same wing sometimes a row of 8 or less black dots (ab. **punctifera** *ab. nov.*). *punctifera.* Beneath both wings bear a discocellular dot as well as the distal one of the transverse lines of the upperside. Prothorax, and apex and base of abdomen ochreous; underside light ochreous brown. 28 to 38 mm. — Japan (Kiushiu).

vira. **D. vira** *Moore* (30 f). Violet-grey, but abdomen and hindwing yellow. Forewing with an antemedian reddish brown line originating at a dark costal spot, a similar postmedian spot, a white spot at the upper angle and two at the lower angle of the cell, and a reddish brown submarginal line. On the hindwing the two transverse lines are only present in the abdominal area. Underside yellow. 30 mm. — West China, Sikkim.

scabiosa. **D. scabiosa** *Butl.* (30 f). Upper side brownish or pearly grey; forewing with orange costa, a dark grey submarginal streak, greyish brown fringes and an indistinct discal oblique mark formed of small greyish white spots; hindwing with discocellular mark formed of three similar small spots and two or three not easily visible parallel discal greyish lines. Collar golden orange. 32 mm. — Japan, Corea, Amur, Central China. Larvae full-grown in August, on Quercus mongolica, where they rest on the upper side of a leaf the edges of which are slightly drawn together by single threads. Pupa hibernates. Moth from the beginning of June to the end of July. — The figure of this species in Ill. Lep. Het. Br. Mus. 11, pl. 25, fig. 9, is not good.

flavilinea. **D. flavilinea** *Leech* (48 b). ♀ smoky grey, suffused with violet, basal line of forewing yellowish and indistinct, median line yellow, originating at the yellowish apex, and near the latter merging together with the likewise yellowish submarginal line; these lines are all continued transversely over the hindwing; apex of forewing produced and obliquely pointed; a small white discal spot present. Underside light ochreous brown. Discal area of both wings greyish and transversely crossed by a faint line; forewing with a small white discal spot; 32 mm. In July. — Central China.

parvula. **D. parvula** *Leech* (= muscula *Stgr.*) (48 d). Forewing mouse-grey, with three oblique dark transverse lines not reaching the costal margin, at the apex of the cell two round white spots and at the apex of the wing a comma-shaped, slightly curved, longitudinal streak. Hindwing like the forewing, but slightly lighter in the basal area, with small obsolete median spot. ♂ 25 mm. — Amur, North and Central China.

fenestrata. **D. fenestrata** *Leech* (48 b). Forewing greyish brown suffused with violet, with two blackish antemedian lines and an oblique double line from the apex to the hind margin, a small vitreous spot in the centre and 8 similar ones at the apex of the cell. Hindwing in the basal area like the forewing, in the distal area rusty red, with a double median line. 26 to 30 mm. — Western China; in May.

palleolus. **D. palleolus** *Motsch.* Colouring and size as in *D. lacertinaria*, but without central transverse bands. Ground-colour pale yellowish, forewing above with dark transverse bands in the marginal area, hindwing with abbreviated dark transverse band in dorsal area. Below the wings are unicolorous. Legs brownish yellow. Eyes black. ,,Exp. al. 11. 1“ (according to Motschoulsky). — Japan, on the Main Island and Hokkaido.

argenteola. *bracteata.* *simplificaria.* *patrana.* **D. argenteola** *Moore* (30 f). Head reddish yellow, body otherwise light brownish yellow, wings about the same in colour. Forewing with traces of an antemedian line, a large dark discocellular spot, a brown double line from close to the apex to the inner margin beyond the centre, and a row of dark submarginal dots; silvery blue scales here and there. Hindwing with a straight median transverse double line not reaching the costal margin, a row of postmedian dark dots, and silvery scales along the line and at the margin. — **bracteata** *Hamps.*, from Ceylon, probably occurring elsewhere as an aberration, is much darker, the discocellular spot of the forewing is separated into 3 spots and there are more silvery scales. — In the Berlin Museum there are ♂♂ from Japan (Yokohama and Nikko) which, beside the nearly whitish yellow colour of their wings, are distinguished by the entire absence of the discocellular spot (ab. **simplificaria** *ab. nov.*). — **patrana** *Moore* (30 f), which seems to occur at Darjeeling as a local variety (there are specimens from the former coll. Atkinson before me), is darker on the forewing and in the dorsal area of the hindwing than the main form (unfortunately I have no specimens for comparison from the typical locality of the latter, Java), being sometimes nearly uniformly brown, but the yellow transverse band and black discocellular spot contrast with the ground; beneath with a dark transverse line on both wings. ♂ 32 to 38 mm. This form probably occurs as an aberration together with the main form. ♂ 30 to 45, ♀ 50 mm. — Widely distributed in India, also in Java, and likewise in Japan, Central and West China. On the wing in July and August. — *D. biocularis Moore*, placed here by Hampson as a synonym, the type of which is before me, is doubtless a distinct species.

grisearia. **D. grisearia** *Stgr.* (nec *Leech*) (48 d). Yellowish grey with two darker transverse lines on both wings, not quite reaching the costal margin, on the forewing the one begins somewhat beyond one-third of the inner margin and runs to nearly the middle of the costal margin, the other is very slightly curved and extends from about four-fiths of the inner margin to shortly before the apex of the wing. The lines of the hindwing are parallel and end far below the costal margin. 23 mm. — Amur. Flies at the beginning of June.

innotata. **D. innotata** *Hamps.* Head, thorax and abdomen white. Wings hyaline, with a few scattered white scales and entirely without markings. ♀ 36 mm. — Kulu (Kashmir).

bidens. **D. bidens** *Leech* (48 c). Margin of the purple-black forewing deeply concave below the apex and less deeply so before the inner margin, with a brownish edge, and a line and a cloud of the ground-colour and a broad whitish band. Hindwing lighter than forewing and without whitish submarginal band. Underside light ochreous brown with dark grey discal area. 30 mm. — On the wing in July, in Central China.

rufulus. **D.(? ?) rufulus** *Motsch.* Size of *D. lacertinaria*, but narrower. Reddish brown-yellow; forewing above and below distally with a light band-like marking; hindwing above and below pale reddish at the base; legs red with brownish yellow tarsi. Eyes black. ,,Exp. al. 12½ 1“ (according to Motschoulsky). — Whether a species of *Drepana* or even a Drepanid?

undulifera. **D. undulifera** *Hamps.*, from Tibet, the ♂ of which is known from Yatung, is whitish, entirely suffused with light rust-colour. Head dark rusty yellow. Forewing above and beyond the centre with rusty yellow zigzag lines, which are sharply angulate below the costa, then oblique; dark spots at the angle of the cell. Hindwing with slight traces of yellow; beyond the middle a narrow line from the submedian fold to the inner margin. 32 mm.

specularia. **D. specularia** *Walk.* (30 f). Reddish brown, forewing with traces of two antemedian and two postmedian wavy lines, a light spot in the cell and two below the base of vein 2, a large light subhyaline smear in and around the apex of the cell, the veins traversing the smear dark. A similar semihyaline smear in the hindwing, as well as traces of two antemedian, two postmedian and a submarginal wavy line. 46 mm. — It is at least doubtful whether this species belongs to the Palearctic Region. Swinhoe certainly records the type as from ,,North-India“ in his Catalogue (1892), but Walker himself writes ,,North-Hindustan“, and other authors (Butler, Moore, Cotes and Swinhoe) say Darjeeling, or (Hampson) Sikkim.

muscularia. **D. muscularia** *Walk.* (30 f). ♂ dark purple-grey, vertex reddish yellow. Forewing with reddish yellow costa, antemedian, postmedian and submarginal dark wavy lines, the posterior half of the marginal area occupied by a large wine-red smear. Hindwing similar, but the whole marginal area wine-red. 42 mm. — Habitat as in the preceding species.

violacea. **D. violacea** *Butl.* (48 d). ♂ light purple-grey. Forewing with reddish yellow costa, both wings with traces of an antemedian line and an oblique sharply marked reddish yellow postmedian line, which is continued through the centre of the hindwing. 38 mm. — Kashmir.

lilacina. **D. lilacina** *Moore* (48 d). Closely allied to *japonica*, but the forewing longer, the colour, which varies from silver-grey to light straw-yellow, not quite the same, and the brown transverse lines narrower and edged with deeper yellow. On the costal margin an antemedian and two postmedian dark transverse spots; before the proximal one of these spots the first transverse line runs almost vertically to the inner margin, while the second begins at the costal margin between the apex of the wing and the distal one of the three spots; both lines are continued on the hindwing. Forewing with dark submarginal dots. 33 to 41 mm. Sikkim, Kashmir, in September. — *simillima.* **simillima** *Moore* differs in that the sharply marked transverse lines are absent, the spots being also absent or only indicated. Forewing with small brown discocellular bar. Costal area of forewing whitish. Antennae and face golden brown. ♂ 38, ♀ 43 mm. Kashmir.

10. Genus: **Spica** *Swinh.*

Forewing with an areole, at the apex of which the short-stalked, or at least strongly approximated, veins 8 and 9 originate, while 7 and 10 are thrown off near the apex of the areole. Middle tibia with one pair, hind tibia with two pairs of spurs. Pectinations of antenna of ♂ short and close together. Segments 1 and 2 of palpi densely scaled. — Only one species of this genus in our area:

parallelangula. **S. parallelangula** *Alph.* (48 c). Forewing bright light yellow, suffused with brownish at the costal margin, with a violet tinge; three slightly brownish parallel transverse lines, one subbasal, one antemedian and one submedian, which are elbowed almost at right angles in the centre with the point directed marginad; at the apex of the wing a similar oblique streak. Hindwing lighter, more greyish white, and without markings. ♀ 36 mm. — West China; Amdo district. On the wing in June and July.

B. Proboscis present. Frenulum absent.

(Genera 11 and 12).

11. Genus: **Deroca** *Walk.*

Differs in the following particulars from *Phalacra*, which is otherwise the only genus of this group characterised by the presence of the proboscis and absence of the frenulum: Antennae of ♂ with long pectinations, of ♀ with short ones, wings hyaline or subhyaline, forewing with rounded apex, vein 6 originating from the areole, likewise veins 7—11, in the hindwing 8 anastomoses with 7 for a considerable distance.

hyalina. **D. hyalina** *Walk.* (48 c). Body black with sparse white hair. Wings hyaline, with slight traces of two postmedian and one submarginal wavy line, the forewing also with two similar antemedian ones; marginal spots and line indicated. 34 to 44 mm. India, also North-Western Himalayas, Central and Western China. In Sikkim a small, less completely hyaline, form occurs, which may at least be separated as a variety (*subhyalina.* **subhyalina** *var. nov.*).

inconclusa. **D. inconclusa** *Walk.* (= maculata *Moore*). Differs from *hyalina* in the more distinct and more spot-like markings and the white hair on the wings; at the costal margin three dark spots, a large double discocellular spot present, in the marginal area two rows of partially confluent spots, the hindwing with traces of two postmedian transverse bands and 6 distinct marginal spots. ♂ 33, ♀ 36 to 43 mm. Widely distributed in India, also in Kashmir. — *phasma.* **phasma** *Butl.* (48 c), from Japan, has darker and more sharply marked spots, the inner-margin of the forewing, which bears two spots in the main form, is without spots, and the hindwing bears markings only at the margin, viz. very small spots. — Leech records the species also from Western China, but does not say whether his specimens belong to the main form or the variety.

12. Genus: **Phalacra** *Walk.*

Differs from the preceding genus in the following characteristics: Antennae of ♂ serrata, of ♀ widened and flattened, forewing with prolonged sharp apex, vein 6 originating from below the angle of the cell, but 7—10 from the areole; hindwing nearly rectangular at vein 6. Habitus more like that of the Thyridids.

vidhisara. **P. vidhisara** *Walk.* (= metagonaria *Walk.*) (30 f). Greyish brown with a reddish tinge and a few black scales here and there, as well as marginal and submarginal black dots. Indications of transverse lines on both wings. Fringes divided by black. ♂ 28, ♀ 38 mm. Larva spindle-shaped with broad head, bristly and spinose, green with a red dorsal band edged with yellow, and with two red lines. Pupa purple-brown with white pubescence. — Widely distributed in India, also in West China.

C. Proboscis and frenulum absent or obsolescent.

(Genera 13 to 15).

13. Genus: **Cilix** *Leach.*

Apex of forewing not sickle-shaped; on the hindwing veins 7 and 8 anastomose so as to form an elongate basal cell, the two end-branches being on a long common stalk. On the forewing 6 and 7 originate from the angle of the cell, 8, 9 and 10 are stalked. Frenulum vestigial. Antennae of ♂ with short bipectinations to the apex, of the ♀ with strongly reduced pectinations. Hind tibiae with middle and end spurs. At rest the wings folded in steep roof-shape. — Larva like that of *Drepana*.

glaucata. **C. glaucata** *Scop.* (= spinula *Schiff.*) (48 d). White, thorax posteriorly blackish brown. Forewing with grey median band widened posteriorly, which does not reach the costal margin and is posteriorly intermixed with violet-grey and lead-grey. Some of the veins are silvery white in the median band. On the inner side the median band is bounded by faint olive-brown. Before the margin a row of small triangular grey spots. Margin of hindwing darkened with grey. 24 to 27 mm. South and Central Europe, also in Southern Sweden; further in North Africa, Asia Minor, Syria, Armenia, Kashmir, the Himalayas, China, Amur, Ussuri, North America. April and May, July and August; in the South apparently in three broods. The specimens from the Himalayas differ in that the palpi are absent, the hind tibia has only one pair of spurs, and vein 7 of the forewing is curved upwards, entirely or almost entirely anastomosing with 8, 9 and 10; this form, perhaps *depalpata* better regarded as a distinct species, I name **depalpata** *subsp. nov.* — **asiatica** *Bang-H.* (48 d), from Asia Minor, *asiatica.* has the forewing almost uniformly white, with only a small triangular brown spot in the median area at the inner margin. There is a specimen like this before me from Ain Draham in Tunis from coll. Seitz. — Larva reddish brown with two pointed protuberances on segment 2 as well as 3, the posterior ones being larger and white in colour at the tip; segments 11 and 12 each with two very small similar projections. On the anal segment a sharp point and in front of it a small wart. Head with two small elevations. The median segments sometimes bear a light spot with a darker spot dorsally. 18 mm long. On Blackthorn, Plum and Hawthorn. June, August and September. Pupa light brown with bluish wing-cases, in a cocoon between leaves.

14. Genus: **Oreta** *Walk.*

Distinguished from the preceding genus by the forewing being produced at the apex, the sickle-shaped tip, however, being rounded; vein 6 originates at the apex of the cell, 7 and 8 are stalked, likewise 9, 10 and 11, 9 anastomoses with 7 and 8, thereby forming an areole. Legs clothed with long hair. The antennae may be serrate in both sexes, or bipectinate in the ♂.

extensa. **O. extensa** *Walk.* (22 i). Yellow, head and legs red. Wings more or less suffused with reddish brown, the yellow ground-colour usually predominates in the basal area of both wings and in the marginal area (with the exception of the apex of the hindwing). Both wings with white discocellular stripe, and sprinkled with dark dots. Forewing with yellow oblique line from the apex (♂) or shortly before the apex (♀) to the inner margin, a dark spot at the anal angle and sometimes a small similar one at the apex. Occurs throughout *suffusa.* India, likewise in Java, according to Swinhoe (1892) also in Japan. — **suffusa** *Walk.* (22 i), described from Ceylon, is a darker, more brownish form; the yellow ground-colour is almost entirely confined to the basal area and oblique line. ♂ 38 to 43, ♀ 40 to 54 mm. — The larva, in Java, lives on a species of Ixora, in April and May; according to Moore's figure (1859), which is not good, it appears to be light with darker oblique smears, the „tail“ with black and pale rings.

obtusa. **O. obtusa** *Walk.* (22 i). ♂: Forewing with a narrow reddish brown band from directly below the apex of the wing to the middle of the inner margin, the line being slightly convex proximally and separating an inner or anterior brown portion from an outer or posterior yellow one. Both wings with pure white discocellular stripe. Forewing with two black costal marginal spots. Head and legs scarlet. In the ♀ the yellow colour is suffused with greyish brown, and the proximal area of the wing is not darker, or only slightly so, than the distal area; the oblique line of the forewing is less curved. ♂ 40, ♀ 48 mm. India, also in Kashmir. — According *vatama.* to Moore (1865) and Warren (1899) **vatama** *Moore* is a distinct species, which is said to be distinguished by the curved oblique line of the forewing (according to Warren this is straight in *obtusa*) and the sharply marked difference between the light and dark portions of the underside of the wing (in *obtusa* nearly uniformly brownish red); moreover, the antennae of *obtusa* and *vatama* are said to differ (but Warren mentions at the same time that the type of *obtusa* has no antennae). As *obtusa* was erected for a ♀ and *vatama* for a ♂ alone and the specimens of *vatama* known to me are all ♂♂ and those of *obtusa* ♀♀ I am inclined to agree with *obliquilinea.* Hampson in regarding the two forms as sexes of one species. — According to Warren **obliquilinea** *Hamps.*

(from the Punjab, Sikkim, Silhet) are nothing more than smaller and less distinctly marked specimens of *obtusa*; if that is the case the form probably also occurs aberratively further north.

O. pulchripes *Butl.* (22 i). Light brown with a slight yellowish and violet gloss, markings similar to those *pulchripes.* of the two preceding species, but more indistinct, the hindwing appearing almost unicolorous and the oblique line of the forewing ending in the apex of the wing (♂) or shortly before it (♀); only the forewing with a white discocellular stripe, this being placed in a darker smear. — **calceolaria** *Butl.* (22 i) is a more common *calceolaria.* form, in which the larger distal portion of the hindwing and, with the exception of a marginal band, that part of the forewing which is outside the oblique line are bright yellow in colour, but irrorated with black dots; in the anal angle of the forewing a small black spot. — **loochooana** *Swinh.* Allied to *calceolaria*, but the margin *loochooana.* of the forewing less curved in the middle, colouring duller, margin near the anal angle with two black spots, hindwing brown at the apex and with darker dots only in the middle. 38 mm. Linchotes. ♂ 27, ♀ 32 to 37 mm. — Amur, Ussuri, West China, Japan; June, August. Larvae in June on Viburnum. They are marbled with grey, brown and reddish, and are said to have the shape of the larva of *Drepana* (species ?), but „are much larger"; they are found singly on the upper side of leaves and are said in order to pupate to roll a part of the leaf together so as to form a tube closed at both ends by a white web (GRAESER).

O. auripes *Butl.* (48 c), from Japan and China, is closely allied to the following species, but the grey *auripes.* transverse lines of the forewing are far apart from one another, fringes and margin of hindwing light rust-red, body pale whitish brown, metathorax and abdomen suffused with rose red. Wings beneath light ochreous, irrorated with lilac grey, and bearing a curved discal line of the same colour on the forewing. ♀ 44 to 46 mm.

O. calida *Butl.* (22 i), from Japan, differs from *pulchripes* at first glance in the dull brown colouring, *calida.* the more falcate apex and the more strongly curved margin of the forewing. Both wings with two black transverse lines, the outer one of which on the forewing is elbowed in an acute or right angle close below the costal margin; at the apex of the cell of the forewing a large black spot, but no distinct discocellular spot. Underside spotted with reddish grey, and bearing a grey discal stripe, which is angled near the costal margin. ♂ 42, ♀ 51 mm.

O. turpis *Butl.* (30 c) is also Japanese and seems to be rare. Brown with a light greyish gloss; forewing *turpis.* with submedian straight lighter transverse stripe, and with the usual oblique stripe, which extends from the apex to the apical third of the inner margin and is straight except anteriorly. Hindwing with dark marginal band and minute black rows of dots. ♂ 32 mm.

15. Genus: **Hypsomadius** *Butl.*

Its author compares this genus with *Drepana*; it is more robust, the head scarcely visible from above, palpi excessively short; antennae compressed, the segments emarginate; shoulders broad and in a straight line with the costal margin of the forewing; the latter triangular, prolonged at the apex, margin slightly concave; hindwing almost triangular, costal margin straight, inner margin slightly concave, with projecting anal angle, distal margin convex; legs clothed with very long hair to the tips of the tarsi. Nothing is said about venation, tongue and frenulum. However, the tongue and frenulum are absent, which is presumably of greater inportance than the differences pointed out by BUTLER. Vein 5 of forewing touches 4 at the base, discocellular strongly elbowed in the middle, 6 and 7 from the anterior angle of the cell, 7 runs parallel with and quite close to 8 to shortly (about 3 mm) before the apex of the wing, where 7 curves backward, so as to run into the distal margin distinctly below the apex of the wing, while 8 terminates nearly at the apex or close before it; at the same spot where 7 separates from 8 these two veins are connected by a transverse bar, whereby a very elongate areole is formed, while at the same point 9 branches off and runs into the costal margin; 10 is thrown off from 8 a little more basally and also ends in the costal margin. Veins 8 and 11 originate together from the cell slightly proximally of the upper angle. In the hindwing 4 and 5 originate together from the lower angle of the cell, 6, 7 and 8 nearly as in *Drepana*, but the discocellular less oblique.

H. insignis *Butl.* (22 g). Wings silvery grey, with two transverse lines of which the sometimes indistinct *insignis.* inner one of the forewing and the outer one of the hindwing are dentate-sinuate and brownish yellow like the inner one of the hindwing, while the outer line of the forewing, which extends from immediately before the apex to the middle of the inner margin, is dark red as well as straight. Below, the wings glossy rose-colour, with numerous grey indistinct markings; forewing with an indistinct transverse line extending to the apex. 38 to 47 mm. — Yokohama. Only one specimen before me from coll. SEITZ.

Alphabetical List

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12. Family: Callidulidæ.

Only a very few species of this otherwise purely Indo-Australian family, comprising about 30 species in 3 genera, are found in the extreme South-East of the Palearctic Region. They are all small moths of black brown ground-colour, with orange yellow band on the forewing; only exceptionally the yellow colour also appears as a broad band on the hindwing or entirely replaces the dark ground-colour, being rarely absent.

The venation is distinguished by the middle discocellular being absent on both wings or only faintly indicated on the forewing, so that the cells of the *Callidulidae* are open, as is the case in some Saturnids. It must be left undecided whether the absence of the cross-vein in these small moths is a sign of the perfection of their power of flight as in the Apaturids and many Saturnids; however, their agility on the wing is very marked for such small insects.

Head small, with rather broad frons, eyes naked, ocelli absent; palpi sometimes much enlarged, usually of median length, second segment long, hairy, third usually bare, sometimes also prolonged; antennae of median length, setiform, sometimes almost imperceptibly incrassate in the last third. Thorax slender, almost like that of a butterfly; likewise the abdomen, which is only slightly stouter in the ♀ than in the ♂. Fore and middle tibiae scaled, the latter with long end-spurs, hind tibiae with two pairs of spurs. Forewing broad, very variable in shape, sometimes pointed, sometimes with rounded or truncate apex. Hindwing oval, often angulate in the middle. Frenulum small (*Callidula*, *Pterodecta*) or entirely absent (*Cleosiris*).

Nothing is known to me of the early stages. The moths briskly fly about by day in the sunshine in open places in the woods and at road-sides, and like to suck the dew off the grass with their strong proboscis; they also drink at damp places on roads. When settled they keep their wings half spread, nearly as in *Chrysophanus*; when asleep they close them like a butterfly. They are nearly all not rare, and some species I found in considerable numbers together. Their principal home is the Malay Archipelago, especially the larger Sunda Islands and New-Guinea; distributed northward to Amurland and Japan, eastward to the Philippines and Moluccas, and southward to Northern Australia.

The family has twice been monographed by A. PAGENSTECHER. Systematically the Geometer-like Uraniids are closely allied to it, but for technical reasons this family will be dealt with later.

1. Genus: **Pterodecta** *Butl.*

This genus contains larger species. It is at once recognisable by the truncate apex of the forewing, whose apical edge is slightly concave. The antennae are curved somewhat in lyre-shape and slightly stouter towards the apex; the palpi are the longest among the Callidulids, especially in consequence of segment 2 being slightly prolonged and segment 3, which is scaled like the others, very strongly so. Hindwing slightly angulate at the upper median vein. Forewing with yellowish red luniform band; underside with colouring and markings of a small dry leaf. Distributed from the Eastern Himalayas to Japan.

P. felderi *Brem.* (= gloriosa *Butl.*) (22 f). Above dark brown, forewing with yellowish red luniform discal band, from the middle of which a tooth extends to below the middle of the cell. All the characteristics claimed for the Japanese form (*gloriosa Butl.*) are also found in continental specimens, the luniform band varying greatly in width and intensity of colouring; the white-centred dots in the middle of the disc on the underside may be absent, present or increased in number, etc. Not rare, in North- and Central-China, at I-chang, Chang-Yang, in Amurland and in Japan. The moths are on the wing in the spring in the sunshine, and their flight recalls that of certain species of *Thecla*. *felderi.*

P. anchora *Butl.* (22 f). Similar to the preceding species and perhaps only a western form of it. The discal band of the forewing much narrower, more pointed at both ends, lighter (more yellow) in colour, the proximal tooth continued as a light orange spot, which extends below the lower edge of the cell and sometimes into the cell. — In Kashmir (Kulu, Dharmsala), but also in the Indian Himalayas. *anchora.*

2. Genus: **Schistomitra** *Butl.*

The only known species of this genus was described as a Chalcosid and placed near *Chatamla*. But *Chatamla* is also no Chalcosid and was only placed in that subfamily of *Zygaenidae* on account of the superficial, doubtless mimetic, resemblance of certain *Chatamla* (e. g. *tricolor Butl.*) to certain Chalcosids (*Psaphis euschemoides*, cf. vol. 10, pl. f d). PRYER still placed it among the Chalcosids, between *Elcysma* (cf. this vol. pl. 3 a) and *Pidorus* (2 e), but already expressed the opinion that this is not its proper place, suggesting that *Schistomitra* belongs to the Geometrids. Only lately has it been classified among the *Callidulidae*, but it is doubtful whether it will retain this position. PAGENSTECHER does not mention it in his two monographs of this family. LEECH correctly places it near *Pterodecta*.

Head small; palpi small; antennae stout, slightly dentate on the inner side; thorax stouter than in the preceding genus; legs stout and short; thorax woolly, abdomen stout, velvety, not reaching the anal angle. Forewing very broad. Costal margin short and straight, outer margin curved, inner margin straight, almost as long as the costal margin; all the veins separate, costal vein ending at two-thirds of the costal margin subcostal branches 1 and 2 thrown off some distance before the apex of the cell, 3 and 4 on a long stalk, 5 and upper radial on a short stalk from the upper angle of the cell; lower radial branch considerably nearer the upper than the lower angle of the cell; discocellular slightly curved; median branches widely separate at their origin. Hindwing pear-shaped, broad, with rather long costal margin; costal vein long; subcostal giving off two branches from the apex of the cell; the radial vein originates considerably above the middle of the discocellular, which is oblique and slightly curved; median branches distant from each other at their origin, the submedian reaches the anal angle. — Known only from Japan.

funeralis. **S. funeralis** *Butl.* (48 g). Of medium size; thorax black with yellow collar; wings black; forewing with ivory yellow basal stripe below the costa, a broad curved band whose inner edge is deeply indented and wavy at the apex of the cell, and also with a broad discal band consisting of 8 elongate spots separated by the veins, the upper ones of which are rather long and linear, the fourth being short and quadrangular. On the hindwing the basal part of the costal margin is also creamy yellow; a broad band widened costally above the apex of the cell fills up nearly the whole basal half of the wing, which, like the forewing, bears a discal band separated by the veins into 8 spots. Abdomen with four orange bands. On the underside the thorax is clothed with white hair laterally, and the abdomen orange with four longitudinal rows of black spots. — As yet only known from Honto, from Fujisan and Nikko. The moth seems to be very local.

Alphabetical List

of the forms of Palearctic *Callidulidae* with a reference to the original descriptions.

*) signifies that the species is also figured at the place cited.

anchora Pter. *Pagenst.* Jahrb. Ver. Naturk. 40, p. 238.
felderi Pter. *Brem.* Lep. Ost. Sib. p. 38 *.
funeralis Schist. *Butl.* Trans. Ent. Soc. Lond. 1881, p. 4.

13. Family: Saturniidæ.

Although there are many forms among the Saturnids which differ greatly in facies as well as in structure, yet the family is sharply defined. The differences from allied families, such as *Brahmaeidae*, *Bombycidae*, *Eupterotidae*, etc., however, refer to venation only, as all the other characters which are generally mentioned as being characteristic of the Saturnids s. lat. apply only to some of the species which belong here.

Forewing with two to four subcostal veins, the two lower ones of which are on a common stalk; the second radial of both wings always in or before the middle of the apex of the cell; costal of hindwing free from the base, neither connected with the cell by an oblique bar, nor anastomosed with it for a short distance, nor curved down to near the apex of the cell; first submedian vein, frenulum and retinaculum absent; tongue always weak, without function.

The two halves of the tongue are separated, with irregular long fringes, and often altogether absent. Palpi long and obliquely erect, or quite small and hidden in the wool of the head and forelegs, with all intergradations, often united at the base, without basal spot of modified hairs. Antennae also very diversely developed, usually without scales, or the shaft sparsely covered with long scales which easily fall off, in some Neotropical genera however (*Lonomia*, *Draconopteris*) densely scaled to the apex; the pectinations always without scales, in most species first curved upwards, then sideways and downwards, but in the afore-mentioned American species obliquely down-turned from their bases nearly as in the Eupterotids and Lymantriids. Most species have quadripectinate antennae in the ♂, each segment of which (often with the exception of the distal ones) bears a proximal and a distal pair of branches. Similar antennae are very rarely found outside this family (e. g., among the *Sphingidae* in *Cressonia* and *Monarda*, and in the Eupterotids in *Gangarides*). In many cases the distal branches of every segment are entirely absent; the distal and proximal pectinations are also never quite alike. In the typical Saturnid antennae, whether bi- or quadripectinate, the thin and rather long sense-hairs are situated on the distal side of the basal process and on the proximal side of the apical one, the upper and lower hairs being directed respectively up- and downward. In the ♀ the antennae are quadri- or bipectinate or dentate or simple, the teeth being shorter than in the ♂ in all cases, and we may here mention the remarkable fact that in many species with exceptionally strongly plumose ♂-antenna the ♀-antenna has on the contrary smaller pectinations or teeth than in allied species with smaller ♂-antenna. Both sexes frequently bear conical sensory organs at the apical edges of the segments, and often also on the pectinations, the cones being in this family much more numerous than in others (sense-cones).

The ocelli are always absent. The head is always retracted and small in proportion to the thorax and abdomen. The abdomen is more woolly in those species that spin a cocoon than in the forms which pupate in the ground without a cocoon; in the latter species the long scales are often hard and almost spiniform.

The tibiae are always without spines. The spur at the inner side of the foretibia (epiphysis) often extends nearly to the tip of the tibia, in other forms it is more or less reduced and sometimes entirely absent; it is more strongly developed in the ♂ than in the ♀. The spurs of the middle and hind tibiae are short and claw-shaped in typical Saturnids, their bare apical portion usually being finely dentate like the claws of the tarsi; in many forms, however, the spurs of the tibiae are long, and a large number of species have a second pair, or a single short spur representing this second pair (present in most Heterocera), on the hind tibia beside the always present end-pair. The tarsi are never very densely spinose, and have generally no spines at all on the upper side; the short fourth segment of the fore tarsus of the ♀ is prolonged on both sides and here bears a short stout spine; the sole of segment 5 of this tarsus is in the ♀ often only clothed with short hair. The pulvillus is present and usually large, but is sometimes absent (e. g. in *Hemileuca*). The paronychium has only one lobe on each side and is entirely obsolete in some genera (e. g., in *Hemileuca*, *Eudia*).

The shape of the wings is extraordinarily variable. Among *Othorene*, *Adelocephala*, and other *Ceratocampinae* the Sphingid-facies prevails; in many species of this subfamily of the Saturnids, especially in the ♀♀, the hindwing has a similar shape as in *Lasiocampidae*. Long-tailed species occur in different groups of the family, and sickle-shaped forewings also occur independantly of each other in not closely allied genera. The discocellular eye-spots, which in no other family are as abundantly developed as in the Saturnids, are only present in certain groups and absent in the larger number of species. The difference in the development of the venation is very interesting, especially the reduction of the subcostal branches of the forewing from four to two, the various stages of development being found in allied genera. We here mention incidentally that the subcostal branches which morphologically correspond to branches 4 and 5 are always present, reduction taking place in subcostals 1 to 3. In some text-books the lower branch is erroneously described as being subcostals 4 and 5 fused together.

At the base of the forewing above there is a short, more or less curved, spur, which has erroneously been called „cocoon-cutter." As Chapman has proved, it is a support for the moth in emerging from the cocoon. The latter is softened by a liquid given off by the moth from the mouth so as to facilitate emerging. The spur is best developed in Australian species, and very much reduced in the Saturnids which do not spin a cocoon.

The larvae of Saturnids are adapted in the most different directions, and do not present a single character which applies to all the species. The typical forms bear 6 rows of thorny warts which are, however, even in these forms often partly or entirely absent in the last stages. The dorsal warts of the thorax and segment 11 frequently remain when the others are obsolescent, and are sometimes developed to large defensive horns (*Eacles*, *Citheronia*, *Arsenura*, etc.). Poisonous hairs are widely distributed in this family, especially among the smaller American forms. In many species the two dorsal warts of segment 11 are united to form one high wart or a process resembling the horn of the *Sphingidae*. According to whether these two warts are joined or separated, the Saturnids have been divided into two groups, but this is an artificial classification, quite closely allied species showing this difference (e. g., *Cricula trifenestrata* and *C. andrei*).

Only a portion of the Saturnids has the faculty of spinning a cocoon. Nearly all the African and a large proportion of the American Saturnids pupate in the ground without a cocoon, like nearly all Sphingidae, but not one of the Palearctic and Indo-Australian species has lost the faculty of spinning. The cocoons are often different in the different species or genera, but often also vary geographically and individually. The pupae enclosed in cocoons, as might be expected, exhibit characters which are absent in those buried in the ground, while the latter again have special adaptions. In all pupae, in accordance with the slight development of the buccal organs of the moth, the sheaths of the mouth-parts are short, so that the wing-cases always touch one another. Many of the pupae having cocoons are suspended in the latter by means of hooked bristles of the cremaster and sometimes on a special transverse wall. In many species however the pupa lies loose in the cocoon. The bristles of the cremaster are then usually also present, but have more or less lost their hooked shape. In the pupae buried in the ground the cremaster is often long and thin.

With very few exceptions the moths are nocturnal and many do not fly before midnight.

Among the Saturnids there are several species which approach *Bombyx mori* in economic importance. The production of Saturnid silk is quite considerable in Asia, and large quantities of raw silk and cocoons are exported to Europe for the manufacture of silk goods. Three *Antheraeae* especially are domesticated for the production of silk: In India it is *Antheraea mylitta*, from which Tussore silk is obtained, in China *A. pernyi*, and in Japan *A. yamamai*, both of which live on Oak, and which it has been attempted to breed on a large scale in Europe, with moderate results.

The family is predominantly tropical, the number of Palearctic species being insignificant as compared with the abundance of species which inhabit tropical America or Africa. But our Region has some characteristic types. *Saturnia*, *Eudia* and *Aglia* do not extend beyond the Palearctic Region. *Neoris*, *Caligula*, *Rhodinia*, etc., are genera which either only occur on Palearctic territory, or have at most reached the mountains of Northern India. Other more widely distributed genera have their home in the Himalayan countries, which are Palearctic for the most part, and the neighbouring districts of China, as e. g. *Actias* and *Loepa*. The American Saturnid fauna is connected with the Asiatic one by *Actias* and *Saturnia*, which in America are represented by allied forms, whose range has become extended southward.

1. Genus: **Actias** *Leach.*

Palpi short, of the same colour as the fore tibiae, and therefore contrasting with the frons. Antenna of ♂ long-quadripectinate, with the exception of the last six to eight segments, which have only one process on each side, this being moreover much shortened; the processes become distinctly shorter from the middle segments both basad as well as apicad; in the ♀ also quadripectinate, but the teeth much shorter than in the ♂. Head, prothorax and legs not rough, the abdomen and base of wings, however, rough and woolly. Spur of fore tibia scaled; hind tibia with one pair of spurs, tarsi with fairly numerous spines, sole of fifth fore tarsal segment not scaled in ♀. Cell of both wings closed, cross-vein incurved; forewing with four subcostal branches on a common stalk, the first branching off far more distally than the fourth, the second quite short, the third distinctly downcurved, ending in the outer margin, the lower median proximally to the middle of the cell; hindwing produced into a tail, which is supported by three veins (the lower radial and the two median branches), cell slender, subcostal near the base, the first radial about in the middle of the cell, more proximal than the two median branches, which are near together. — Larva at first reddish, in the later stages green, with swollen segments, hair thin, long and rather sparse, six rows of low warts clothed with spines and a very long central hair and usually also a few shorter hairs, segment 11 with 5 warts, the dorsal one of which is central and higher than the others, segment 12 with four warts. Cocoon brown, dense, spun in one or several leaves of the food-plant and fastened to thin twigs. Silk of inferior quality. Pupa with hooked bristles at the anal end, by which it is attached to the cocoon.

A number of species of the Old and New Worlds, which have been distributed over several genera. In China there occur more species than anywhere else.

The genus extends eastward to the Moluccas.

dubernardi. **A. dubernardi** *Oberth.* ♂: Wings narrow and long, yellowish green, distal margin of both wings broadly pink, discocellular spot of forewing connected with the costal margin. West China. Tse-ku. — Sonthonnax describes a ♀ from Leou-fang, which he places here with some doubt. It is perhaps the ♀ of *sinensis*. Its wings have some red only on the tail, and the hindwing bears an ocellus, but the discocellular spot of the forewing is united with the costal margin as in the ♂.

felicis. **A. felicis** *Oberth.* (34 a). ♂: Pale green; forewing narrow, with strongly rounded apex and outer margin, fringes yellow, ocellus small, a wavy line parallel with the margin between this and ocellus. Hindwing likewise narrow, the ocellus much nearer the outer margin than in *selene*. — West China: Siao-lu, in coll. Oberthür.

sinensis. **A. sinensis** *Walk.* (33 b). ♂: Pale yellow; forewing sharply pointed, outer margin evenly concave. Both wings with a wavy line basally of the middle and between the ocellus and the margin a second very deeply waved line widened into dots at the veins, ocellus in both wings with reddish lunule, and on the forewing connected with the costal margin, tail long, thin, almost straight. The markings more reddish below than above. — Northern China; North-Eastern Assam. Only a few specimens are known of this and the preceding species; the following species, however, are common. *sinensis* is here figured in colours for the first time.

A. artemis. A short-tailed species in which the tail is so curved outward that its hind margin is strongly angulate in the ♀ and less so in the ♂; by this character the species can easily be distinguished from specimens of the following which are otherwise very similar. The discal line of both wings is, moreover, wavy above and below; when the line is absent above it is at least indicated by dots on the veins. The genitalia confirm the opinion that these differences are specific. Larva on various deciduous trees. Moth in June and July. Hibernates as pupa. Amurland and Japan. Three subspecies. — *artemis.* **artemis** *Brem.* (33 b), from Amurland and Askold, probably also occurs in Corea. The discal line is nearly always absent above and is generally only indicated beneath by dots on the veins. In the Tring Museum there is a gynandromorphous specimen (♀ on the right side, ♂ on the left). ab. *caeca.* **caeca** *Stgr.* are specimens without ocelli; this name has been omitted in Staudinger-Rebel's Catalogue. — In *aliena.* **aliena** *Butl.* (33 a), which is known to us from Yezzo and the Main Island of Japan, the discal line is usually distinct, but specimens also occur in which scarcely a trace is present even on the underside. — *xenia.* **xenia** *subsp. nov.* is found on the Liu-kiu Island Okinawa, and therefore really occurs outside the Palearctic boundary; but as that is the most southern point of the species, the form may be described here for the sake of completeness. Forewing traversed by an oblique line at the origin of the lower median branch, this line being absent in the two other forms; discal line distinct on both wings, especially strongly developed above; on the underside of the hindwing a brown marginal line, fringes yellow. In one specimen the wine-red colour of the costal margin, collar and legs is replaced by pale yellow; ab. *flavicollis.* **flavicollis** *ab. nov.*

selene. **A. selene.** The tail of ♂ and ♀ longer than in *A. artemis*, and directed more backward, its hind edge therefore less curved. The discal line not regularly undulate, and often accompanied by a second line. Egg brown, densely dotted, reticulate in transmitted light. Larva first red, then green, the warts of the green stages reddish orange with the exception of four dorsal warts on the meso- and metathorax, which are larger than the others and green with a black ring; the warts on segments 11 and 12 also remain green. On various deciduous trees, in India especially on Coriaria nipalensis, Andromeda ovalifolia, Hibiscus, Salix babylonica, Wild Cherry, Walnut, etc. The moths appear already in the spring and are found throughout the summer. From Japan and the Amur to Ceylon and Borneo, and in most places not common. — *gnoma.* **gnoma** *Butl.* (= dulcinea *Butl.*, mandschurica *Stgr.* pt.) (33 c). A small form. Ocelli and tail without red; the black arc of the ocellus thin, separated by a pale yellow lunule from the transparent discocellular bar. Tail of ♂ about as long as the wing is broad at the level of the ocellus, in the ♀ shorter by at least one-third. On the Main Island of Japan, common from April to October. — *mandschurica.* **mandschurica** *Stgr.* is a link between *gnoma* and *ningpoana*. The name was originally based on a medley of specimens from Amurland and China, and *ningpoana* was not at all referred to in the description. If *mandschurica* is valid at all, it may be restricted to specimens from the Amur and Ussuri districts. Ocelli and tail usually without any distinct red colour (in a ♂ from Raddefka before me the ocellus has a very distinct red lunule), tail of both sexes longer than in *gnoma*, outer margin of hindwing less convex from the apex to the base of the tail, the black lunule of the ocellus stronger. — *ningpoana.* **ningpoana** *Fldr.* (= mandschurica *Stgr.* pt., selene [Hbn.] *Leech* pt.) (33 b). Larger on an average than the two preceding forms, very much like true *selene*, but always distinguishable from it by the absence of the red colour from the tail. From Peking and Shantung to Central and Eastern China and Formosa. — In Southern China and in Hainan *selene Hbn.* occurs; West-Chinese specimens also have the tail partly red, and must be placed with *selene*. In North-Western India *selene* does not reach the Palearctic Region.

Hybrids of *Actias*:

mortoni. hybr. **mortoni** *Tutt* = *luna* ♂ × *selene* ♀.

2. Genus: **Graëllsia** *Grote.*

Closely allied to *Actias*. Antennae of ♂ with longer pectinations, only the three or four last segments with only one process on each side, the distal segments below not prolonged at the apex either in the ♂ or the ♀, the apical branches of each segment short, the proximal ones on the middle segments about as long as a segment, the bristles at the tips of the pectinations and the sense-cones at the apical edges of the segments numerous. Frons and underside of thorax more rough-haired than in *Actias*. Spur of fore tibia shorter and slenderer, in the ♀ not half so long as the tibia; fifth segment of fore tarsus of ♀ densely scaled also below, short. Forewing with three subcostal branches and sometimes with the indication of a fourth, the penultimate one terminating at the costal margin slightly before the apex, as it not down-curved at its apex as in *Actias*; the upper median slightly more distant from the base than the stalk of the subcostals, in the hindwing the upper median and the third radial branches close together, the cross-vein straight, placed in the centre of the round ocellus, the upper angle of the cell of the hindwing obtuse. — Larva with six rows of small warts, on segment 11 as in *Actias* the two dorsal warts fused together to form one larger median wart; upperlip short, broadly excised; antennae short. Cocoon moderately dense, semitransparent and soft. Cremaster of pupa coarsely wrinkled, obtuse, covered with numerous hooked bristles, by means of which the pupa is attached to the cocoon. A species confined to Spain, characteristically modified and representing a side-branch of *Actias*. Its distribution recalls the Cicindelid *Tetracha euphratica*, which is in Europe also only found in Spain, but again in the East in Anterior Asia.

isabellae. **G. isabellae** *Graëlls* (33 c). Body reddish brown, head and thorax with yellow markings, abdomen ringed with yellowish grey. Wings green, veins reddish brown, ocellus reddish distally, red and grey proximally, surrounded by a black ring. — Larva first greenish black with light stripes; when full-grown light green, a broad dorsal stripe reddish brown, accompanied on each side by a light line, the reddish brown colour continues laterad and forms a girdle becoming wider below on each segment (with the exception of the thorax) and being interrupted by two light oblique streaks, between which lies the stigma; large black transverse patches on the thorax. Cocoon reddish brown. On Pinus maritima, also feeds on other conifers in captivity. Sierra de Guadarrama, north and east of Madrid, most common near Bronchales. Pupa hibernates, cocoon on the ground. A detailed description of the larva is given by Chapman in Ent. Record 1902, p. 126.

3. Genus: **Samia** *Hbn.*

Tongue present, in the ♀ hidden between the palpi, in the ♂ distinct but functionless. Pectinations of antenna of ♀ not much shorter than in the ♂, the cilia directed down and forewards, the basal and apical branches of each segment almost equally long, with the exception of the last eight or nine segments, on which the apical branches are absent or quite short. Abdomen with many tufts of short wool arranged in rows. Spur of fore tibia almost reaching the end of the tibia, last segment of fore tarsus of the ♀ not scaled beneath, middle and hind tibiae with apical spurs. Both wings with narrow central lunule, the transparent portion of which is curved and linear; cell of both wings open; forewing with three subcostal veins, the first branch from the cell, more rarely from the stalk of the two others, the second curved downwards at the apex of the wing so that it ends in the outer margin, the upper median vein nearer the base than is the stalk of the subcostal. — Larvae powdered with white; with six rows of fleshy thorns, which bear sparse bristles, the dorsal processes longer than the lateral ones in the earlier stages, later on the difference smaller. Cocoon long, pointed at both ends, usually wrapped up in a large or several small leaves. Pupa without bristles at the anal end. Two species, one of which is confined to India, while the other occurs from Japan to India and eastward to the Sula Islands, and is also acclimatised in several localities in Europe and North America.

S. cynthia. Abdomen with rows of small white woolly tufts. Grund-colour of body and wings varying from clay-colour to olive-brown, the anterior portion (towards the costa) of the lunule transparent, thinly scaled with white, the posterior portion clay-colour; a white discal line traverse both wings, with a black inner and a more or less reddish outer edge, in the basal area of the wings a distally black-edged white line which is so strongly broken on the forewing that the anterior portion is parallel with the median branches and the posterior part with the costal margin. Underside almost as above, but without a line in the basal half. ♀ like the ♂, only with shorter and broader wings. Larva at first yellowish, then white or greenish or bluish green, with black dots; the dorsal processes in the later stages about as long as the distance between two dorsal processes of the same segment; the processes of the different segments almost equal, bluish. Polyphagous, chief food-plants: Ailanthus, Ilex, etc.; prefers Syringa in Europe, but also takes Prunus, Pirus, Juglans, Laburnum, and other plants. The cocoon consists of an outer layer of loose silk and an inner dense web. The silk, from which a very tough cloth is made, cannot be reeled, but is carded and then spun. It is coarse and not valuable for export. — True **cynthia** *Drury* is confined to the Malayan districts. — On Palearctic territory two forms are found: **pryeri** *Butl.* (33 a) inhabits Japan. The proximal band of the forewing more or less convex posteriorly, without long teeth on the median veins, the discal band twice deeply incurved, only faintly reddish *) outside the white line, at least the red line is never sharply defined; on the hindwing the discal band is deeply incurved below the halfmoon. The cocoon is grey or yellowish white. The larva (tscho-san) are found especially on Ilex rotunda, Ailanthus glandulosa and Phellodendron amurense. — The specimens from North and Central China, **walkeri** *Fldr.*, are distinguished from *pryeri* by the discal band of both wings having a sharper outer edge, and by the long median teeth of the proximal band of the forewing. This form goes northward to Manchuria and Corea, and is much kept domesticated for the sake of its silk, e. g. in the provinces of Shantung and Che-kiang. This form was introduced into Europe in 1845 and has been domesticated in France with some success. — In the Northern districts the species has only one brood, in the Southern countries several broods in a year. The second species of the genus, *S. lunula Walk.*, is likewise easy to breed, and crosses between it and *S. cynthia* are also known. *cynthia.* *pryeri.* *walkeri.*

4. Genus: **Rhodinia** *Stgr.*

Outer side of tibiae and tarsi rough-haired, spur of fore tibia in the ♂ long with obtuse apex, in the ♀ much shorter and thinner with pointed apex; segments of tarsi with apical spines, which are numerous in *fugax*; pulvillus large. Antennae characteristic: the shaft higher than it is broad, ventrally with a sharp median carina which has no minute hairs; in the ♂ the apex of the segments (with the exception of the proximal ones) produced, all the segments long-quadripectinate, the branches of the median segments as long as four segments, those of the distal segments gradually becoming shorter, all with long apical bristles; in the ♀ also quadripectinate, but the distal processes of the median segments at most as long as one segment, and the proximal ones not longer than two. Venation also peculiar: cell of both wings open, but usually indications of the cross-vein present, ocelli represented by an oval, lunular or triangular vitreous spot which has a narrow white and then a brown edge; forewing with four subcostal branches, 1 and 2 branching off far distally from 3, radials 1 and 2 stalked; in the hindwing the subcostal as well as the lower median originating distally to the middle of the cell, the latter more distal than the first. — Larva almost naked, granulose, the six warts of the prothorax separated, but the two dorsal ones close together, the dorsal warts of the metathorax the largest, segment 11 with one dorsal wart instead of 2. Cocoon egg-shaped, but truncate at the upper end, and attached to a leaf or slender twig on one side so that the cocoon appears stalked at one corner (pitcher-like), dense, without outer loose silk. Pupa attached by the hooked bristles, which are placed close together, to a loosely woven transverse wall, which stands close to the apex of the cocoon. The full-grown larva as well as the pupa makes a loud chirping noise when disturbed. Distributed from the Himalayas to Amurland and Japan.

R. fugax. Vitreous spot round, ovate, or proximally almost straight and with a rounded outer edge. Sexes very different. ♂ almost uniformly reddish brown with brownish black markings, or the ground-colour partly light yellow, apex of forewing strongly produced, the outer margin deeply concave, all lines irregular. ♀ light yellow with brown lines, the distal one of which is placed near the ocellus and only slightly dentate. Larva on Phellodendron. Cocoon green. The species has been frequently bred in Europe during the last years. Japan and Amurland. The moth in the autumn. — **fugax** *Butl.* (34 c). The ♂ more or less yellow or light reddish brown above in the basal half of both wings. ♀ with very sparse brown dusting above and below. Japan, especially on the Main Island. — **diana** *Oberth.* (34 c). ♂ more unicolorous and darker than *fugax*. ♀ with denser brown dusting above in the costal marginal half of the forewing and between the discal lines of both wings, and below from the base to the yellow marginal area, than in the preceding form. Amur, Ussuri, Suifun, Vladivostock, Askold. *fugax.* *diana.*

R. jankowski *Oberth.* (34 d). Much paler than the preceding species and more thinly scaled. The sexes almost alike. The vitreous spot proximally concave, lunular. Outer margin of forewing nearly straight also in the ♂. Body, base of wings and marginal area of forewing yellow, through both wings a non-dentate pale line with an outer and inner dark brown edge; rest of upper side blackish brown, median area slightly shaded with reddish brown. Larva first grey, then green, with a row of small blue lateral spots. Cocoon brown. On Phellodendron. — Amurland, in the same districts as *R. fugax diana*; the moth in the autumn. *jankowski.*

R. davidi *Oberth.* (34 d). Vitreous spot very narrow and long, with yellow edges. Body and wings clay-colour, the margin of both wings light yellow, before the margin a zigzag line, the teeth of which are truncate as in the allied species, proximally to this line, which is very thick on the hindwing, on the forewing a row of clay-coloured spots on a yellow ground, and on the hindwing a narrow yellow band. — West China, only in a few collections. *davidi.*

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*) too red in our figure.

5. Genus: **Loepa** *Moore.*

Palpi not visible from above, but distinct in a lateral view, as they have the dark colour of the fore tibiae and therefore contrast with the frons. Antennae of ♂ quadripectinate, of ♀ bipectinate. The spur of fore tibia long, not scaled, obtuse. Forewing with rounded apex, and four subcostal branches; upper radial from the cell, cross-vein curved, placed about in the middle of the ocellus, lower median much more proximal than the stalk of the subcostals. Hindwing with distinct though weak short innermarginal vein (which is absent in the allied genera).

The species are very similar in markings and colouring. Yellow, sometimes partly brownish red, the collar and the costal margin of the forewing brown; ocellus more or less deep rust-brown, larger on the forewing than on the hindwing and below smaller and much less distinct than above. Forewing above with a proximal irregular line, which is sometimes double, and a deeply waved discal line dentate on the veins, further distally there are two parallel lines near together, before the margin a white line or a row of white arcs and below the apex a black spot. The markings of the hindwing very similar, but the proximal line more zigzag, and the black subapical spot absent. Paler beneath than above, the markings less distinct. ♀ like the ♂, but with shorter and broader wings. — Larva known of only one species (*sikkima Moore*). Clothed with rather sparse thin hairs, six rows of warts bearing spines and a long central hair, segments 4 to 10 with a white spot behind the stigma, a smaller spot on segment 11; when half and quite full-grown reddish brown shaded with blackish, warts red. A younger specimen before me almost entirely red; head and pronotum blackish. The youngest stages are said to be black with red warts. Cocoon dense, longitudinal, pointed at both ends. Food-plants: Cissus and Leea. It would be a task well worth undertaking to breed from the eggs the two common Indian species *L. katinka* and *sikkima*. China, India, Malay Archipelago.

oberthuri. **L. oberthuri** *Leech* (= dogninia *Sonth.*, dognini *Sonth.*, oberthüri *Leech*) (32 d). The first subcostal branch of the forewing branches off from the cell. Forewing above suffused with brownish red from the base to the discal double line, and from the hind margin to the ocellus; ocelli incurved. — Central China, August. In North-Eastern Assam and Tonkin there occurs a species of a similar colour.

damartis. **L. damartis** *spec. nov.* (34 d). A small and very pale species. Light straw-yellow; the proximal line of the forewing red, simple, the black subapical spot ovate, above and below it a red streak; hindwing below without a red spot at the apex. The four subcostal branches of the forewing on a common stalk, the first originating more distally than the last. ♂ and ♀ almost alike, the forewing of the ♂ much shorter and rounder than in the other species. Most closely allied to the Indian *miranda Moore.* — Central and Western China, in the late summer.

katinka. **L. katinka** *Westw.* Venation similar to that of *damartis.* Upperside chrome-yellow; proximal line of forewing double, the black apical spot of the forewing oblique, rounded distally, without a red streak below it; hindwing below with small red spot at the apex. Ocelli with inner black ring or halfring. — West, Central and South-Eastern China, North India; common in the summer, in China especially in July.

The common Indo-Malayan *L. sikkima Moore* is not known to me from the Palearctic Region.

6. Genus: **Salassa** *Moore.*

Palpi distinctly projecting in a side-view. Antenna of ♂ quadripectinate with the exception of the last one or two segments, the shaft as well as the branches with some spiniform bristles. The segments of the antenna of ♀ on each side with a short process, which is at most as long as two segments, these processes longer in the distal half of the antennae than in the proximal half, shaft and process with numerous spiniform bristles. Tibiae and tarsi smoothly hairy and scaled, not rough. Spur of fore tibia long; middle tibia with one pair of spurs, hind tibia with two pairs (which is seldom the case in the Saturnids). Tarsal segments with only one pair of spines at the apex on the middle and hind legs, and in the ♀ also as in most genera with a pair at the apex of the fourth segment of the fore tarsus. Forewing pointed, with a vitreous spot which is more or less edged with black, but not developed to a real ocellus; with three of four subcostal branches, the first always from the cell, the second short and near the apex of the wing, often absent, the third terminating in the apex of the wing or close below it in the outer margin, first radial from the cell; transverse vein in both wings angulate or curved, placed at the proximal side of the vitreous spot, forming an acute angle with the second radial in the forewing. Hindwing only above with a ringed ocellus. — Larva not described. The cocoon consists of leaves and bits of wood spun together. Northern India and China. Seven species are known as yet.

thespis. **S. thespis** *Leech* (34 b). ♂ rusty red; forewing with a black line in the basal fourth, which, in contradistinction to *S. lola Westw.*, is not edged with greyish white, vitreous spot triangular, on the disc a blackish line, in which stands a row of small vitreous spots, more distally a broad blackish band. Hindwing before and beyond the centre respectively with a black band, the bands united anteriorly to form a regular curve open behind and enclosing the ocellus; the latter with greenish yellow ring, which has a reddish tinge posteriorly and does not touch the outer black band. Beneath, both wings almost alike in colour and markings, without ocelli, only with a vitreous spot, a blackish discal line edged with white is sharply developed. ♀ yellowish olive with much larger vitreous spots than in the ♂. — Only known to me from Central China (I-chang) and the Province of Fo-kien, probably of wider distribution in China.

S. olivacea *Oberth.* (34 d). Not known to me in Nature. Apex of forewing not produced. Thorax and *olivacea.* wing brownish yellow with a greenish tinge; on both wings a proximal and a discal black band, the first having an outer and the latter an inner white edge, outside the discal line a broad pale ochreous band dentate distally, vitreous spot of forewing large, ovate; ocellus of hindwing black, with large rounded transparent pupil. — Ta-tsien-lu, West China.

S. royi *Elwes.* Both sexes of the forewing with a large round or oval vitreous spot. ♂ blackish chest- *royi.* nut, antenna and collar more yellowish. ♀ to the greater extent olive-yellow, thorax chestnut, anteriorly pale yellow. Hindwing of ♂ and ♀ grey from the costal margin to the hind margin of the cell, ocellus black with white ring. — In the Himalayas, where the species occurs both on Indian and Palearctic territory.

7. Genus: **Antheraea** *Hbn.*

Palpi and frons with rather short scaling, not rough and woolly, end-segment of palpi distinctly marked. Antenna of ♂ quadripectinate, the processes very long, with the exception of the seven to ten last segments, whose branches are so short that the apex of the antenna has the appearance of being simple; the distal branches are altogether absent on the last 6 to 8 segments. In the ♀ also quadripectinate, but the distal branches of each segment always short and on the last 8 to 10 segments only vestigial; in the ♂ and ♀ the apical edge of the distal segments (about 10) produced below. Tibiae and tarsi laterally with rather long hair-like scales, rough, the spur of fore tibia not scaled, long and broad in the ♂, much shorter and slenderer in the ♀; tarsi with very few spines; fifth segment of fore tarsus of ♀ scaled in the middle of the sole, but the narrow scales easily fall off. Forewing with three subcostals, the first (morphologically the second branch) originates from the cell, or from the stalk of 3 and 4, or directly outside the fork, in single specimens the rest of the real first subcostal (SC^1) is indicated as a small branch thrown off from SC^2, SC^3 always absent, the branches forming the fork being SC^4 and SC^5, SC^4 always distinctly bent down at the the tip, therefore ending in the outer margin, not in the apex, the stalk of the subcostal fork originates at the same level as the upper median, lower median from the middle of the cell, upper and lower radials separate, cross-vein present; costal vein of hindwing always terminating in the apex or outer margin, not in the costal margin, subcostal at the same level as the lower median or more proximal. Basal spur or forewing very well developed. — Larva sparsely hairy, with six rows of warts bearing thorns and a few long hairs widened at the apex; above the stigmata a longitudinal line; upper lip with deep narrow incision; antenna long. Pupa short and broad, without distinctly marked cremaster, loose in the cocoon, not attached by the cremaster; the bristles at the anal end not hooked as in *Actias*, and not united in two bundles as in *Caligula* and allied genera. Cocoon very dense, covered with a loose web and usually wrapped in a few leaves of the food-plant, ovate, attached to a small twig with one end by means of a short or long stalk. A purely local Asiatic genus, extending from North-West India to the Moluccas and northward to Japan and Amurland. The Saturnids most important for the silk industry belong to this genus; especially three species are domesticated: *yamamai* from Japan, *pernyi* from China and *mylitta* from India. The silk of *mylitta* is an important article of commerce, and is known by its Indian name Tussore (Tussah, Tusser, Tussur). About a dozen and a half species are known, three of which inhabit the Palearctic region.

A. harti *Moore.* A very peculiar species only known to me from the specimens in the British Museum, *harti.* and one specimen in the Museum of the Silk Laboratory at Lyon. Dark brown, fringes bright yellow, ocellus almost alike on both wings, surrounded by a narrow black ring, outer half yellow, inner half brownish red, transparent pupil round, large. First subcostal branch of forewing from the stalk of the fork. Larva green, with a golden spot at the base of most dorsal warts. Cocoon yellowish white, fastened to a branch by a long stalk. On Oak. The species is semi-domesticated, and is said to have two broads a year. Niwchwang, Manchuria. — In reports on the production of silk in China *A. pernyi* is mentioned as a moth common near Niwchwang; perhaps some of the specimens may be *harti*. It is often very difficult to discover to which species the reports of the consuls and the observations of missionaries refer. The species of *Antheraea* are so similar that they are constantly mistaken for one another — even an entomologist like STAUDINGER was quite in the dark about the differences between *pernyi*, *yamamai* and *mylitta**) —, and on the other hand in silk literature the moths and cocoons bred on different plants are often known under different names so that, from an entomological point of view, it is often impossible to do anything with the records of occurrence of a moth.

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*) cf. STAUDINGER, in ROMANOFF, Mém. Lép. VI, p. 328 (1892), and LEECH, Trans. Ent. Soc. Lond. 1898, p. 265.

A. yamamai *Guér.* (34 b). The shaft as well as the lateral processes of the antennae of the ♂ longer than in *A. pernyi* and *A. mylitta*, the segments not blackish at the base in ♂ and ♀. First subcostal branch of forewing always branching off from the cell, the subcostal of hindwing further from the base than the lower median. The genitalia of the ♂ are particularly characterised by the long bristles (about 8) on the upper process of the valve only being moderately thickened, and segments 8 and 9 not being strongly chitinized dorsally and not prolonged to form a distally widened process. The outer margin of the forewing distinctly wavy, especially in the ♂; the median band of the forewing is always close to the base of the upper median branch. The black ring of the ocellus of the hindwing is anteriorly widened to form an elongate spot into which the yellow colour of the ocellus does not penetrate. The blackish submarginal spots of the underside are longer and farther away from the margin than in *A. pernyi* and form a more or less contiguous lunate line, at least on the forewing. The ground-colour is very variable. We distinguish five principal types, which are connected by all *yamamai.* transitions and not local, and were regarded as species by Butler: f. **yamamai** *Guér.* is light yellow in the ♂ with moderate brownish red suffusion; the ♀ paler yellow, brownish red distally to the black and white discal *hazina.* line. In f. **hazina** *Butl.* the yellow ground-colour is almost entirely covered with brownish red. f. **calida** *Butl.* *calida.* *morosa.* is uniformly reddish brown. f. **morosa** *Butl.* (34 a) is the darkest form, uniformly dark brown. f. **fentoni** *Butl.* *fentoni.* (34 b), on the other hand, is a more or less grey form. Finally we mention as ab. **sergestus** *Westw.* the ♀ de- *sergestus.* scribed by Westwood as a species; it stands between f. *hazina* and f. *fentoni* in colour and has exceptionally much red in the ocelli of both wings. — Larva in the first stages pale yellow with black stripes; when full-grown greenish yellow, the warts yellow with black spines, glossy silvery spots laterally. On Oak; can also be bred on Chestnut. Cocoon greenish yellow or yellowish green, not rough, without a distinct stalk. The silk of Japanese cocoons is easily reeled and is very tough; it is difficult to dye with ordinary methods and is usually worked in with the mulberry silk. *A. yamamai* is confined to Japan, but during the last 40 years attempts have been made in various countries to acclimatise the moth, so that in collections specimens are met with labelled China, Ceylon, Northern India, Spain, etc. — The history of the introduction of the moth into Europe is quite romantic. It was interdicted in Japan under penalty of death to export living eggs, pupae or moths. In 1860 the French consul Duchesne de Bellecourt managed to obtain secretly a larger number of eggs and to send them to France, where they arrived in February. Several larvae pupated and one moth (a ♀) was obtained, so that Guérin-Méneville could describe and figure the egg, larva, cocoon and ♀. Shortly afterwards, in 1863 a Dutch doctor stationed in Japan, Pompe van Meedervoort, shortly before leaving for Europe obtained eggs of *yamamai* hidden in a cane from one of his pupils who was particularly attached to him, and brought them safely to Belgium. The species was successfully bred from these eggs. Since then the moth has been introduced in various districts of Europe (Spain, France, Italy, etc.) for the production of silk. But the silk of the cocoons bred in Europe is inferior in quality, and the yield is of no importance for the silk industry.

pernyi. **A. pernyi** *Guér.* (= constans *Stgr.*, confuci *Moore*) (34 d). Antennae of ♂ with shorter pectinations than in *yamamai*, the segments of ♂ and ♀ black at the bases. The first subcostal branch of the forewing does not originate from the cell, but is stalked with the other subcostals, usually branching off beyond, or close before, the fork formed by the two other subcostals; cell of both wings slenderer than in *yamamai*, subcostal of hindwing at the same level as the lower median vein, and therefore more proximal than in *yamamai*. Segments 8 and 9 of abdomen more strongly chitinized dorsally in the ♂, forming a process projecting anad and being strongly broadened at the apex, the bristles of the clasper thicker than in *yamamai*. Colour less variable than in that species, ground-colour yellowish grey to reddish brown, in the ♂ usually less bright than in the ♀. The glassy pupil of the ocellus of both wings round, usually circular, the black ring narrow, on the hindwing only slightly widened anteriorly, on the widened part filled in by the yellow or yellowish brown of the ocellus. The lines and outer margin of the wings even, the discal line rarely slightly wavy. The blackish submarginal spots of underside short, separate, further away from the margin than in *yamamai*. — Egg brown, without the spots and black dots of *yamamai*. Young larva black, the warts with white hairs; later on green, the upper warts orange, the most ventral ones blue, all clothed with black hairs widened at the tip, above the stigmata a longitudinal line, in the last stages silvery spots stand beside some of the warts; numerous white short lanceolate hairs are distributed over the sides and back. On Oaks, easy to breed and much more robust than *yamamai*; also takes Chesnut, Carpinus and other deciduous trees. Cocoon with short stalk, wrapped in leaves by means of rough silk. — The species is distributed from the Amur to Southern China, and in India is represented by *royli Moore*. The silk exported from China (Chinese Tussore) is largely obtained from this species.

A. pernyi has two broods in the year, and hibernates as pupa; the summer cocoons contain twice as much silk as the winter ones, but the silk is coarser and darker than the spring silk and is especially used for export to Europe. Development from the egg to the moth takes on an average from six to seven weeks. The moth (in nature) is said to be found from the spring (May) till the late summer. The result of its introduction into Europe has not been so successful as was expected; but the species is still being kept domesticated in different places in Spain, France and on the Balearic Islands.

Staudinger, in 1892 was quite uncertain about *yamamai* and *pernyi* and suggested the name var. *constans* for the "moths bred in Europe and called *Pernyi*", which "vary very inconsiderably" and are "always light ochreous brownish". As Staudinger did not know from where these moths originally came, and as his description applies just as well to *pernyi* as to *roylei*, the name *constans* is best treated as a synonym of *pernyi*.

Hybrids of the Palearctic *Antheraea*.
hybr. **moorei** *Tutt* = *roylei* ♂ × *pernyi* ♀. *moorei.*
hybr. **kirbyi** *Tutt* = *pernyi* ♂ × *roylei* ♀. *kirbyi.*
hybr. *yamamai* ♂ × *pernyi* ♀, and *pernyi* ♂ × *yamamai* ♀ are also known; the first subcostal branch is thrown off either from the cell or directly after it.

8. Genus: **Caligula** *Moore.*

Tongue absent. Palpi very small, not visible from above, united at the base, hairy and coloured like the frons. Antennae of ♂ quadripectinate to the apex, the branches of a segment almost equally long, with the exception of the last 7 or 8, whose distal branches gradually become shorter, the branches of the middle segments as long as 5 or 6 segments; in the ♀ bipectinate, but the distal branches also represented by more or less distinct teeth, the branches of the median segments as long as one or two segments; shaft in ♂ and ♀ below clothed with fine hairs and short bristles, without the central naked stripe of *Neoris*, etc. Cell of forewing very strongly narrowed basally, the median vein being incurved, half as long as the wing, broader than the cell of hindwing, three subcostal branches, the first well developed, the common stalk branching off from the cell at almost the same level as the upper median; cross-vein incurved in both wings, almost in the middle of the rather large ocellus. Spur of fore tibia of ♂ and ♀ long and slender; hairs and scales of tarsi smooth. — Larvae, as far as known, with 6 rows of very low warts, which bear single long hairs, the warts of the two dorsal rows in the first stages considerably larger than the lateral ones, which are very small; the whole body moderately densely hairy, the dorsal hairs widened in spear-shape towards the tip and almost all of equal length. Cocoon reticulate, brown. Pupa strongly granulate-rugate; cremaster truncate-emarginate, the angles widened laterally, each with a bunch of short stiff bristles in a groove.

The species occur in the Himalayan countries and Eastern Palearctic Asia.

C. thibeta consists of two geographical forms. Yellowish grey, tinged with reddish; the antemedian and discal lines tinged with brownish red, ocellus with black pupil, between ocellus and the broad submarginal band of the hindwing three deeply wavy lines. More grey below than above, the ocellus of both wings nearly alike, with small black pupil. — In true **thibeta** *Westw.* (34a), from the North-Western Himalayas (Kumaon), *thibeta.* the discal shadowy band of the upper side of the forewing is so curved that it nearly forms a right angle with the costal margin; both wings more uniformly ochreous and reddish than in the Indian *extensa Butl.* from Sikkim and Assam, the forewing more stumpy, and the underside less grey. Larva on Pieris ovalifolia, like the cocoon and the pupa not yet described. The moth in the autumn.

C. boisduvali. Thorax above brownish wine-red, sometimes more yellowish, more rarely blackish red, abdomen paler. Forewing with antemedian and discal line, which are close together from the cell to the hind margin, being sometimes united on the submedian fold; the discal line double and waved from the ocellus to the black apical dot; the area enclosed by the two lines grey, more or less reddish and continued at the costal margin and in the cell to the base; collar of the same colour, a band running from the apex to the hind margin and strongly widened behind brown and festooned distally, another of the same colour on the hindwing; ocelli of both wings almost alike, brownish red with black outer ring, small black pupil, brownish grey ring and thin white lunule. Underside paler, more unicolorous: the median area not contrasting, the wavy double line almost parallel with the outer margin, on the forewing the brownish band outside it not much broadened behind; a reddish or brownish shadowy line runs through both wings, standing outside the ocellus on the forewing and traversing the ocellus on the hindwing. Larva green, above and below with a black brown longitudinal stripe, the warts of both dorsal rows reddish yellow, full-grown without stripes (always?). On various deciduous trees. Cocoon reticulate. The moth in the autumn. From Lake Baikal to Japan in three geographical forms. — **boisduvali** *Ersch.*, from Kiachta, Urga and the Kentei Mts., southward of Lake Baikal. *boisduvali.* The median area of the upper side of the forewing whitish grey, the space between the ocellus and discal band and the submarginal line on both wings also very light, strongly prominent; the upper side almost entirely without a yellowish or reddish brown shade. Underside with much whitish grey, especially at the proximal and distal sides of the ocelli, the wavy lines rather conspicuous on account of the light ground-colour, and the submarginal line almost purely white. — **fallax** *subsp. nov.* (= jonasi *Stgr.* pt., boisduvali *auct.* pt.) (30d as *fallax.* *boisduvali*). Upper- and underside of ♂ with reddish brown tinge, especially on the upperside of the hindwing, both sides much less grey than in the preceding form, the lines above as well as below less prominent. The ♀ paler than the ♂, more yellowish brown, especially at the margin. Distributed from Vladivostok, Askold, Us-

jonasi. suri to the Amur. — **jonasi** *Butl.* (32 b, d). Much more unicolorous and darker than the preceding forms; forewing longer, all the lines much less distinct, the submarginal line of both wings only white or whitish behind; the ocelli smaller and more transverse. Japan, on the Main Island in September. Two nearly full-grown larvae before me have no longitudinal stripe above or below.

C. lindia. Wings grey, sometimes with a reddish tinge. Forewing above with a heavy oblique almost straight black subbasal line, which is proximally more or less distinctly bordered with red, at the ocellus a usually indistinct zigzag line, which is followed by two parallel festooned lines, the outer one of which is represented by a black dot at the costal margin, between them and the margin two quite feebly festooned lines, in between which there are usually distinct light spots on the veins; hindwing longer anteriorly than in *boisduvali*, the subcostal vein farther from the base, the outer ring of the ocellus partly or entirely red, between base and ocellus an almost straight dark line, distally of the ocellus an indistinct zigzag line and in the marginal area four lines, the two inner ones of which are much less dentate than the corresponding lines of the forewing. *lindia.* The ♀ similar to the ♂. Larva and pupa not known. Himalayas. — **lindia** *Moore* (= hockingi *Moore*) (32 b). The ocellus of both wings with black excentric pupil, which is bounded by a white discocellular bar proximally. *bonita.* The light submarginal spots small and diffuse. North-West India and Kashmir, June and July. — **bonita** *subsp. nov.* Much more brightly coloured, the colours more strongly contrasting than in *lindia*, on the upper side the grey-white submarginal spots of the forewing almost as sharp as in *bieti*, but smaller, the black pupil of the ocellus smaller on the forewing and absent on the hindwing; on the underside the red colour of the ocelli more extended and on the hindwing the ocelli without black pupil, the markings in the marginal area of both wings brighter. Yatung, Tibet, two pairs in the British Museum.

bieti. **C. bieti** *Oberth.* (32 a). Forewing above and below grey with large black basal spot, and between ocellus and outer margin festooned parallel lines which are produced into long teeth on the proximal side; ocellus of hindwing without black pupil. — Western China.

anna. **C. anna** *Moore*, which is known to me from North India and Southern China, perhaps also occurs on Palearctic territory; it is distinguished from *bieti* particularly by the yellow colour of the submarginal spots, the black pupil of the ocellus of the hindwing and the longer wings.

According to Oberthür, Boisduval received a specimen of *C. grotei Moore* from Eversmann with the locality Turkmenia. As the species is otherwise only known from North India it is probably a case of confusion of localities.

9. Genus: **Dictyoploca** *gen. nov.*

Forewing with only two subcostal branches. The distal segments of the antennae below more produced at the apex than in *Caligula*, and with more distinct sensory cones, the pectinations of ♂ shorter, the apical ones on the middle segments of the ♀ short but distinct. Larva at first black, with 6 rows of warts clothed with black bristles, in the following stages greenish yellow below, black above, clothed with long white hairs, then more or less completely white with blue spots at the stigmata, small black dots, and short transverse streaks laterally. Cocoon with much larger meshes than in *Caligula*. Pupa very rugate, apex of abdomen almost truncate in a straight line, forming a sharp edge, on each side with a bundle of short bristles in a groove. The cocoons are used for the manufacture of silk, but both the quantity and quality are negligible. Himalayas to Japan.

japonica. **D. japonica** *Butl.* (= regina *Stgr.*) (32 c). Ground-colour varying, yellowish grey, brownish yellow, or almost olive; the markings on the contrary fairly constant. Forewing above in the basal fourth with a reddish or brownish transverse line which bounds a large basal spot, and with a second rather diffuse line beyond the middle which touches the ocellus at the outer side or stands slightly distant from it; the area bounded by the two lines slightly lighter than the rest of the wing; ocellus oblique. Hindwing usually redder than the forewing, with much larger and more sharply defined ocellus. Below more unicolorous than above; the ocellus *castanea.* on the forewing with black pupil, on the hindwing blind. Pale specimens are f. **castanea** *Swinh.* Larva on Juglans, Castanea, Camphora, in captivity takes Oak, Hawthorn, Willow, etc. The three first stages of the larva almost alike; in the fourth and fifth stages the black colour confined to the sides, the warts of the thorax with a few black bristles between the greenish white hairs, Meshes of cocoon large. Japan (Main Island and Kiushiu), Amurland, North China; the moth in the autumn (September and October), common. The silkglands of the caterpillar are sometimes employed for the manufacture of fishing lines.

simla. **D. simla** *Westw.* (35 a). Larger than *japonica*, the costal margin of forewing grey to the base, and the thorax anteriorly of the same grey colour, posteriorly on the thorax a white transverse band which is absent in *japonica*. Ground-colour less variable, but in some specimens much darker than in others; the brown median band of the forewing traverses the ocellus or touches it on the inner side, being rarely outside the ocellus as in *japonica*. Larva from the third stage already to a great extent yellowish white, full-grown with little black laterally, dorsally a bluish white stripe, on which are pale greenish blue hairs (Watson). Meshes of the cocoon not so large as in *japonica*. On Salix babylonica, also on Wild Pear and Apple, and Walnut. The moth in the autumn, common in North and North-Western India, reaches the Palearctic Region in Kashmir (Swinhoe).

10. Genus: **Neoris** *Moore.*

Tongue absent, palpi small, united at the base, of the same colour as and long-haired like the frons. Antennae slightly chitinised, pale, the branches thin; in the ♂ quadripectinate to the apex, the branches of each segment about equally long, only the distal ones of the last three or four segments shortened, the median branches about as long as five segments, the shaft ventrally with broad naked stripe, no sensory cones at the apex of segments, or now and then a small central apical cone. In the ♀ the shaft of the antenna as in the ♂, all segments quadripectinate, the proximal branches of the median segments twice as long as the distal ones and as long as $2\frac{1}{2}$—3 segments, the distal branches of the last six segments quite short or only just indicated. Cell of forewing slender, shaped almost exactly like that of the hindwing, median vein not so strongly incurved proximally as in *Caligula* and *Perisomena*, three subcostal branches, the common stalk of which is more proximal than usual and branches off almost at the same level as the lower median branch, stalk of the two upper radials longer than the cell is broad; cross-vein of both wings regularly incurved, traversing the proximal part of the large round ocellus. Spur of fore tibia short, not scaled, in the ♂ one-eighth as long as the tibia, in the ♀ quite a small lobe. Tarsi spiny below, segment 5 of fore tarsus of ♀ with naked sole; paronychium short, pulvillus pale and small. Like *Saturnia* in facies. — Larva with similar hair to that of *P. caecigena*, according to Staudinger entirely without warts, not known to me in nature. Cocoon transparent, thin, irregularly reticulate, meshes small. Pupa with very stumpy rounded cremaster, which, on each side in a rounded groove, bears a tuft of short curved, sharp, stiff bristles.

The four forms belonging here represent each other geographically, and agree so closely that they are undoubtedly only forms of one species.

N. huttoni. Varies from brownish grey to dark ochreous. Collar grey. Wings with a simple blackish antemedian line, which has a slight proximal light edge, between it and the base a large grey wedge-shaped spot in the cell of the forewing. On the disc a dark double line which, on both wings, is accompanied outside by a light line and is strongly festooned on the forewing; median area of forewing dusted with blackish, ocellus sometimes smaller on the forewing than on the hindwing, edged with black, especially on the hindwing, inside the same a white curved transverse streak which is not central but is shifted basad. On the underside the ocellus of the forewing is more sharply defined and larger than that of the hindwing. All the forms are Palearctic, one entering the Indian Region in North-West India. Larva on Spiraea and according to Hutton on
Pirus. — **huttoni** *Moore* (31 d), from North-West India, is the most unicolorous subspecies; dark ochreous, the *huttoni.*
lines less distinctly prominent than in the other forms, the black edge of the ocellus of forewing very narrow
and almost obsolete distally. Mussoorie. — **stolizkana** *Fldr.* (= shahdulla *Moore*, shahidula *Moore*, stolizkai *stolizkana.*
Moore) (31 c). More greyish, the light discal line nearly white, the black edge of the ocelli more distinct, and
the outer black discal line heavier than in *huttoni*. Ladak and Yarkand, at an altitude of more than 12 000 ft.
— **galerope** *Püng.* (32 a) is very like *huttoni*, but duller in colour, more reddish brown, the black lines more *galerope.*
distinct, on the underside the white discal line faint or absent, the outer black discal line however usually sharply
defined. Budschnurd, Atrek River, Northern Persia. — **schencki** *Stgr.* (= schenki *Stgr.*) (32 a). The most *schencki.*
prominently marked form; bases of abdominal segments blackish; the black edge of the ocelli broader, and the antemedian and discal lines very distinct, disc shaded with grey. Beneath the white outer line sharply defined. Saisan, Alexander Mts. and Ferghana.

11. Genus: **Perisomena** *Walk.*

Tongue aborted. Palpi very short, united at the base, just as long-haired as the frons, with which they do not contrast. Antennae pale with thin lateral branches, in the ♂ each segment with 4 processes of about equal length, in the ♀ with two, those of the central segments as long as five segments in the ♂, scarcely as long as one and a half segments in the ♀; the cilia of the ♂ are directed up and down. Wings semitransparent, the scales small and deeply slit; forewing with two subcostal branches, the common stalk of which branches off at almost exactly the same level as the upper median branch, sometimes a third subcostal branch is indicated, the two upper radial branches stalked, the first rarely branching off from the cross-vein; cell of both wings closed; the cross-vein almost quite straight, in the centre of the small round ocellus; cell of forewing narrower basally than in *Neoris*, the costal of hindwing into the costal margin, subcostal nearly straight except for the distinctly downcurved apex, ending in the apical angle. Spur of fore tibia not scaled, obtuse, in the ♂ about one-third the length of the tibia, in the ♀ reduced to a short lobe hidden beneath the scaling. Tarsi with spines, especially at the apices of the segments, sole of segment 5 of fore tarsus with a spot of small scales. Larva clothed with numerous thin hairs, some of which are as long as a segment; each segment with six small warts, the dorsal warts larger than the lateral ones, all clothed with very long thin hairs; the dorsal and subdorsal warts bear numerous short spines in addition. Cocoon double; it consists of an outer net with wide meshes and a denser inner one with smaller meshes. — One species, which is closely allied to *Neoris*.

caecigena. **P. caecigena** *Kupido* (32 b). ♂ yellow, at the costal margin of forewing, and usually also distally of the discal line of both wings, pale wine-colour, sometimes nearly the entire wings with the exception of the outer margin suffused with wine-reddish; before the centre an irregnlar line, on the disc a regularly festooned line; ocellus small, somewhat larger on the forewing than on the hindwing. ♀ like the ♂, but the pale wine-red colour much more extended, sometimes nearly the whole moth of this colour, often the wings yellow from the base to the discal line. Egg glossy, flat, and marbled with white and brown, several deposited together. Larva on Oak: first bluish grey, then green, more rarely reddish, the hairs white, the small warts yellow, below the stigmata a raised longitudinal line. Cocoon dark brown, pear-shaped. Pupa light brown, cremaster truncate, sharp, with a tuft of short stiff curved bristles on each side, the whole body with sparse minute hair, the penultimate segment much less rugate than the others. Moth in September and October; flies at night. Hibernates as egg. Distributed from Carinthia and Istria through Dalmatia, the Northern Balkan-States to Asia Minor and Armenia, also in Southern Hungary (Orsova).

12. Genus: **Saturnia** *Schrank.*

Tongue absent. Palpi very small, completely hidden in the wool of the frons and fore legs. Antennae of ♂ quadripectinate to the apex, the pectinations long, becoming gradually shorter distally, the apical ones of each segment only distinctly shorter than the proximal ones of the same segment on the distal segments; in the ♀ also quadripectinate, but the apical processes of each segment shorter than the segment, often reduced to pointed teeth; the shaft of both sexes ventrally with a broad median stripe which is less hairy than the sides, but still bears numerous small hairs, the distal segments more or less distinctly produced below at the apex. Spur (epiphysis) of fore tibia of ♂ long, of ♀ quite short and rounded apically. Tarsi smoothly scaled, with numerous obliquely directed spines. Paronychium and pulvillus well developed. Forewing with three subcostal branches, the first quite short, subapical, the second not downcurved at the apex, the stalk of the subcostals branches off at almost the same level as the upper median branch, cell closed, cross-vein incurved; costal vein of hindwing into the apex, not into the costal margin, subcostal distally of the middle of the cell; ocellus ringed, almost identical on both sides and both wings. — Larva with six rows of warts bearing spines and bristles, the bristles in the later stages club-shaped. Prothorax and segment 12 with only four warts (apart from the small warts above the legs), the dorsal warts on segment 11 nearly as far apart as on the other segments. Cocoon elongate-ovate, grey to dark brown, the opening at the thin end closed by a double weir, the outer weir longer than the inner one. Pupa clumsy, abdomen not downcurved; cremaster obtuse, faintly but distinctly bipartite, its bristles slightly curved, sparse in the median depression, more numerous laterally and forming a loose bundle on each side at the apex. Moth in the spring. Purely Palearctic, from Armenia and Persia to Portugal and North Africa. — Hermaphrodites are comparatively frequent in this and the next genus but one.

pyri. **S. pyri** *Schiff.* (= pavonia major *L.*, junonia *Shaw*) (31 b). Black-brown, collar white, segments of abdomen edged with grey at least above. Median and costal areas of forewing grey, a large basal mark brownish black; on both wings a proximal line, a double discal zigzag line and a submarginal line not reaching the apex and having a broad white or buffish white outer edge, black, the space between the submarginal line and double discal line on both wings at least twice as broad as the light margin and more or less brownish black. Ocellus with black excentric pupil surrounded by a buffish brown or yellow circle, at the proximal side of which there are a white and a dark red lunule, the outer ring of the ocellus black. Beneath more extended grey than above. Larva on kernel and stone fruit, also on Ash, Blackthorn, etc. When young black with yellow warts; later on yellowish green, the warts blue or (more rarely) reddish, with club-shaped hairs and spines. Cocoon grey to dark brown. From Southern Portugal — I found the moth near Monchique — and Oran to South Germany, and eastward through Southern Europe to Persia and Armenia. Hibernates as pupa. Moth in May, comes to the lamp. Distinctly characterised local races are not known. On the whole West European specimens are less extended grey than Eastern ones, and the black discal band on the hindwing is usually less developed at the apex. Conspicuous individual aberrations are not common. The grey colour is sometimes very much extended and in other specimens almost entirely suppressed; sometimes there is a very distinct red tone on both wings, rarely the reddish markings are replaced by yellow ones; the lines are now and again partly obsolete, and the ocellus may be distorted. The following deviations from the normal have received names. *abafii.* ab. **abafii** *Bord.*, light specimens in which the grey is replaced by milky white. *invittata.* In ab. **invittata** *Schultz* the double discal line is absent on both wings. The colour of the apical area of the forewing is yellowish instead *fulvescens.* of reddish in ab. **fulvescens** *Schultz* and the basal area brownish yellow. *subdiaphana.* Ab. **subdiaphana** *Schultz* are very thinly scaled specimens. — For hybrids cf. the genus *Eudia*.

atlantica. **S. atlantica** *Luc.* (= marocana *Aust.*) (31 b). Forewing narrower, the outer margin more concave, especially in the ♂; the discal double line of both wings much more deeply wavy above and below, the ocellus with yellow ring; forewing beside the costal subapical spot with a second smaller spot in front of the lower subcostal; below the subbasal line of the forewing is narrower than in *pyri* and stands somewhat distally of the origin of the lower median. Larva black in the first stage, then green with black warts, and later with yellow ones. Cocoon smaller than in *pyri*, paler. In the Tring-Museum there is a pair of *marocana Aust.* ex coll. AUSTAUT which is labelled "type". They are not different from ordinary specimens from Alger; these *marocana* came from Tlemcen. *matheri.* ab. **matheri** *Vall.*, which is not known to me in nature, was based on a single small dark specimen in which the grey is almost suppressed and the median area reddish; Djidjelli, Eastern Algeria. — The Tring-Museum has a pair of *numida.* **numida** *Aust.* (ex coll. AUSTAUT, labelled "type") which is considerably different from *atlantica*. This form stands between *pyri* and *atlantica*, but the characters of *atlantica* predominate. Larger and more broad-winged than all our 19 *atlantica*; the yellow ring of the ocellus brownish yellow, much less bright than in *atlantica*, the discal lines less deeply wavy, the red apical spots small in the ♂, obsolete in the ♀. Nemours, Oran. According to AUSTAUT and others *pyri* also occurs there; *atlantica* also is found in Oran. I am therefore inclined to think that *numida* is a hybrid. — *S. atlantica* is now often bred in the town of Algiers, and is sometimes found there at the electric street-lamps. Distributed from Oran to Tunisia.

13. Genus: **Eriogyna** *gen. nov.*

Distinguished from *Saturnia* especially by the forewing having only two subcostal branches, and the abdomen of the ♀ being thickened at the apex and densely clothed with anal wool, with which the eggs are covered. The last 10 segments of the antennae are produced ventrally at the apex, but have no distinct sensory cones. Stalk of the two upper radial branches of the forewing short; costal vein of hindwing strongly approaching the subcostal distally, sometimes united with it for a short distance, terminating in the costal margin (as in *E. pavonia*). Pupa with irregular belt of spines at the cremaster (as in *S. pyri*); weirs of orifice of cocoon similar to *Saturnia*. — Only one East-Asiatic species.

E. pyretorum. White or greyish white; head and thorax, with the exception of the collar, and the bases of the abdominal tergites black; anal wool of ♀ black or grey. Wings white; on the forewing a large basal spot, a non-interrupted transverse band outside it, a double, deeply zigzag, discal line and a submarginal line with a white outer edge brownish black, the outer portion of the disc or the entire wing dusted with blackish, two red spots at the apex. Hindwing with a band before the centre and two festooned lines on the disc; distally of them a band with a white distal edge as on the forewing. Ocellus much larger on the forewing than on the hindwing, black with a thin transparent stripe, narrow yellow ring and greyish blue semicircle. Beneath nearly as above, the forewing darker on the whole. ♀ like the ♂, with broader wings. Larvae especially on Liquidambar formosana and the Camphor-tree; striped blue and yellow. Cocoon ovate, hard and dense, brown or grey, attached to a branch on one side, sometimes several spun together. The silk is silvery or brownish grey, coarse and extraordinarily tough. Considerable quantities are obtained (the total being estimated at 30 000 kilos of cocoons). But the species is more important in other directions, fishing lines being made of the silk-glands of the larvae. These lines are much sought after on account of their toughness. The production is said to exceed 7000 kilos of line. The collecting of the larvae is a monopoly for which a rent is paid to the government. *E. pyretorum* occurs from the Amur to Hainan, Tonkin and North India. In Hainan the species is only found in the mountainous interior. According to Consular reports, in South-Eastern China it is especially found in the province of Kwangtung, where it occurs chiefly on the Si-chiao-shan (= Mount Si-chiao). The moth appears early in the year, in Tonkin already in January. — *pyretorum.* **pyretorum** *Westw.* (31 a), from Amurland and North China, often has the ocellus of the hindwing reduced to a dot. The white subbasal band of the forewing is as broad (or nearly) as the black band placed at its distal side, and is also distinct in the cell; the white cellular area at the inside of the ocellus is broader transversely to the cell than in the direction of the veins, the white submarginal band of both wings about as broad as the brown marginal band; median area of hindwing white. Anal wool of ♀ brownish black. — *cognata.* **cognata** *subsp. nov.* (31 a). The white median area of forewing of ♂ and ♀ strongly reduced, the hindwing less pure white than in the preceding subspecies; the underside dusted with blackish, especially on the forewing. Kiang-si, East China, probably also in the mountains of the neighbouring provinces of the Yang-tse-kiang district. Our specimens from April and May, probably bred. — *luctifera.* **luctifera** *subsp. nov.* (31 a), from Western China (Omi-shan). The darkest local form, with reddish tinge, especially on the hindwing of ♂. The black colour of body deeper and more extended, the white median area of both wings of ♂ almost entirely superseded by black-brown dusting; in the ♂ and ♀ the white marginal band narrower than the blackish brown margin; at the apex of the hindwing on the underside a faint reddish spot. Anal wool of ♀ grey.

14. Genus: **Eudia** *gen. nov.* *)

Like *Saturnia*; but the shaft of the antennae with broad bare ventral stripe which bears no hairs and only an occasional bristle, the distal segments beneath not produced at the tip; in the ♂ the branches of the antennae longer than in *Saturnia*. Fore tibia in both sexes without a spur, paronychium also absent, the pulvillus very small and pale, claws slender and less curved than in *Saturnia*. The costal vein of hindwing runs into the costal margin, and the subcostal into the apex. Larva without club-shaped hairs. Outer weir of cocoon less dense and only as long as the inner (*pavonia*) or very imperfectly developed (*spini*). Abdomen of pupa downcurved, more strongly wrinkled than in *Saturnia*, especially near the stigmata, the cremaster blade-like, flattened, rounded when seen from above, on the blunt edge two irregular transverse rows of slightly curved long spines, and on the dorsal side a number of shorter ones. — Name-type: *pavonia L.*

A reduced edition of *Saturnia*, more specialised in the characters mentioned than *S. pyri* and *atlantica*, i. e. being younger in this respect. The anterior subcostal branch sometimes very much reduced, but rarely entirely absent. The genus is purely Palearctic.

E. spini. Sexes very much alike. Ground-colour whitish grey. Abdomen ringed with grey above, beneath entirely black, brown or partly grey; mesothorax posteriorly with a whitish grey transverse band. Lines of forewing similar to those of *S. pyri*, but their position different, especially the double discal line more curved and less deeply wavy, on both wings more sharply defined above and below, nearly parallel with the outer margin, which is rounded; the space between these lines and the antemedian line is always narrower at the hindmargin of the forewing than the greyish black outer band; the latter denticulate at the veins. Larva black, when young with steely blue warts; full-grown also black (*spini*) or for the most part green (*cephalariae*), with yellow warts; hairs grey. Cocoon broader than in *pavonia*, the outer weir only indicated. Pupa more strongly curved than in *pavonia*, the bristles on the cremaster on the whole stronger. From Austria to the Altai. — *spini.* **spini** *Schiff.* (= pavonia media *Esp.*) (31 b, c). Larva black in all stages. As a rule the antemedian line of the forewing has a distinct if slight reddish tinge proximally, and the median area between the ocellus and hindmargin more or less greyish white. The tooth before the apex of the claspers of the ♂ is short and weak. Russian specimens are on the whole darker than those from Austria-Hungary, the red at the apex of the forewing is also often more strongly developed. Conspicuous aberrations from the average are rare. The entire *fusca.* marginal area and the median area from the ocellus to the hind margin are deep black-brown in ab. **fusca** *continua.* *Schultz*. In ab. **continua** *Schultz* the ocellus touches the wavy line. The ocelli are more or less reduced in ab. *microphthalmica.* **microphthalmica** *Schultz*, and quite absent in ab. **obsoleta** *Tutt*; in ab. **oblitescens** *Schultz* on the other hand there is only an inclination towards obsolescence. Weakly scaled specimens are ab. **subhyalina** *Schultz*. The *obsoleta.* *oblitescens.* area of distribution of *E. spini spini* embraces Austria-Hungary (north as far as Moravia and Galicia), *subhyalina.* Bulgaria and Southern Russia. Whether the Asiatic specimens (Asia Minor, Southern Cuacasia) belong to this *cephalariae.* or the next form is not known to me; they are probably intermediate. — **cephalariae** *Rom.* One pair of this form is before me from Kasikoparan in Armenia (M. Korb) which agrees rather well with the figures given by Romanoff. The differences from a series of European *spini* are very small and not nearly as constant as might be expected from the conspicuously differently coloured caterpillar. The whitish grey of the median area is strongly reduced and the wavy line on both wings is united before the hindmargin with the antemedian line, which has no trace of red. The red apical spot of the forewing and the grey-blue lunule of the ocelli are more strongly developed than in most *spini*. The distal ventral tooth of the clasper of the ♂ is longer and broader than in true *spini* and more strongly chitinised. Larva when full-grown similar to that of *pavonia*; green with black segmental incisions and small black transverse lines; the orange-coloured warts stand in black spots. On Cephalaria procera. Russian Armenia, Kasikoparan, 7000 feet.

E. pavonia. Sexes different in colour. Forewing above brown with a reddish tinge, below like the upper side of hindwing for the most part pale yellow; ocellus of forewing in a greyish white area. ♀ very like the preceding species: mesothorax (as also in the ♂) posteriorly without a greyish white band, the pectinations of the antennae shorter, the basal area of the forewing and the wide line outside it more or less strongly angulate on the median vein, this line and the wavy double line further apart at the hind margin, as the wavy line is less oblique than in *spini*, and the red spot below the apex of the forewing larger. Egg whitish, deposited in clusters in ring-shape on twigs. Larva first black inclusive of the warts, then black with orange markings, and finally bright green with very variable black markings and yellow or red warts; sometimes the full-grown larva is quite green, and rarely the last two stages are black. On Heather, Willow, Rose, Sloe, Bilberry, etc., from May to August. Cocoon pear-shaped, brown, the inner and outer weirs of the orifice equally long. Pupa curved. The moth at the end of April and May. The ♂ sometimes flies by day. Distri- *pavonia.* buted from Portugal to Amurland, but not known from Corsica, Sardinia and North Africa. — **pavonia**

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*) Dia = Hebe, daughter of Saturnia (a by-name of Hera).

L. pt. (= carpini *Schiff.*, pavoniella *Scop.*, pavunculus *Retz.*) (31 a), from Central and Northern Europe eastward to Amurland. ♂: hindwing above orange, forewing below deep chrome-yellow. ♀: red subapical spot of the forewing below not reaching the upper radial, the light submarginal band proximally bounded by a more or less distinct blackish line. The following aberrations from the normal, some only very slightly different, have received names. In ab. **makropis** *Schultz* the ocelli are elongate, nearly twice as large as in normal specimens; in ab. **reducta** *Schultz* they are reduced, about half as large as usual, and in ab. **obsoleta** *Tutt* they are absent. In ab. **flavomaculata** *Schultz* the apical spot of the forewing is yellow instead of red. Very dark specimens are ab. **infumata** *Newnh.* In ab. **deflexa** *Schultz* the ocellus touches the wavy line on both wings. In ab. **defasciata** *Schultz*, which was erected on a ♀, the wavy line and antemedian line are absent, and in ab. **edentata** *Schultz* (erroneously published by the author as *identata* and *indentata*) the double line is not dentate; the latter form especially in the mountains and in the north, mostly from pupae which have hibernated twice. ♂♂ in which the broad submarginal band of the forewing is yellowish instead of brown are ab. **ochraceo-fasciata** *Schultz*. In ♂-ab. **decorata** *Schultz* the hindwing bears whitish submarginal lunules with reddish outer edges, and is pale yellow in ♂-ab. **lutescens** *Tutt*. In ♂-ab. **fasciata** *Tutt* the transverse lines of the forewing are merged together from the ocellus backward to form a red band. ♀♀ with the wings suffused with reddish are ♀-ab. **rosacea** *Newnh.* (= erythrina *Schultz*); in ♀ ab. **angustata** *Schultz* the brown band outside the wavy line is only half as wide as usual, and in ♀-ab. **conversa** *Schultz* the transverse lines of the hindwing meet at the abdominal edge. — **alpina** *Frr.* is a small, thinly scaled alpine form. Described from the Valais. — **meridionalis** *Calb.* (= ligurica *Weism.*), from Italy, is larger; the red apical spot reaches to the upper radial also beneath. The upperside of forewing is slightly more yellowish in the ♂ and both wings of the ♀ are on the whole more reddish than in Central-European species. Specimens from the Riviera are best placed with this form. The name *ligurica* was used by WEISMANN for larvae from the environs of Genoa, which moulted once oftener than German larvae and were all entirely green in the last stage. ab. **steffanellii** *Rostagno* are specimens of *meridionalis*.

makropis. reducta. obsoleta. flavomaculata. infumata. deflexa. defasciata. edentata. ochraceo-fasciata. decorata. lutescens. fasciata. rosacea. angustata. conversa. alpina. meridionalis. steffanellii.

Hybrids of the species of *Saturnia* and *Eudia*. The hybrids with *pyri* are distinguished by a spur on the fore tibia, which is absent on those crosses which are only derived from *spini* and *pavonia*.

A. Hybrids with *pyri*.

hybr. **major** *O.*, probably = *spini* ♂ × *pyri* ♀. In colour similar to *spini*; apex of forewing with two red curved spots. *major.*

hybr. **media** *Stgr.*, according to REBEL probably = *pyri* ♂ × *pavonia* ♀. Forewing without red apical spot, ocellus in a dark patch. *media.*

hybr. **daubi** *Standf.* = pavonia ♂ × pyri ♀. Approaches *pavonia* in colour; light grey specimens, which occur in this hybrid in both sexes, are hybr. ab. *emiliae Standf.* *daubi.*

hybr. **standfussi** *Wisk.* = (*pavonia* ♂ × *pyri* ♀) ♂ × *pavonia* ♀ is similar to *pavonia*. *standfussi.*

hybr. **risi** *Standf.* = (*pavonia* ♂ × *pyri* ♀) ♂ × *pyri* ♀ resembles a small *pyri*. *risi.*

hybr. **schlumbergeri** *Standf.* = (*pavonia* ♂ × *spini* ♀) ♂ × *pyri* ♀ stands between *spini* and *pyri* in colouring and marking, nearer *spini*. *schlumbergeri.*

hybr. **complexa** *Tutt* = (*pavonia* ♂ × *pyri* ♀) ♂ × *pavonia* ♀) ♂ × *pavonia* ♀ resembles a large *pavonia*. *complexa.*

B. Hybrids of *spini* and *pavonia*.

hybr. **hybrida** *O.* = *spini* ♂ × *pavonia* ♀. Similar to *spini*, but with larger red apical spot. *hybrida.*

hybr. **bornemanni** *Standf.* = *pavonia* ♂ × *spini* ♀. Nearer to *pavonia*; ♂ and ♀ different in colour. *bornemanni.*

hybr. **dixey** *Tutt* = (*pavonia* ♂ × *spini* ♀) ♂ × *spini* ♀ is very similar to *spini*. *dixey.*

hybr. **schaufussi** = (*pavonia* ♂ × *spini* ♀) ♂ × *pavonia* ♀ is similar to *pavonia*, but the ♂ approaches the ♀ in colour. *schaufussi.*

hybr. **casparii** *Frings* = (*spini* ♂ × *pavonia* ♀) ♂ × *pavonia* ♀ is similar to *pavonia*, but slightly recalls *spini*. *casparii.*

15. Genus: **Aglia** *O.*

Tongue quite aborted; palpi in the ♂ distinctly prominent, coloured like the frons, but more smoothly hairy, segments 1 and 3 short, 2 long, 3 strongly narrowed basally and the scaling at the apex of 2 forming a sort of cavity; in the ♀ much shorter, the scaling rougher. Shaft of antennae with ventral middle keel produced apically on each segment, sense-cones seem to be entirely absent; all the segments of ♂ with 4 processes, the distal ones of each segment being distinctly shorter and slenderer than the proximal ones and standing so close to and above the proximal processes of the following segments that in a dorsal view they look like a single process, the proximal ones with several strong bristles at the apex; in the ♀ there is only a single triangular tooth present, which bears at the apex a strong bristle (seldom 2) which is about as long as the segment, upper side of shaft very slightly convex, clothed with dispersed long scales, similar scales also below, which however easily drop off. Thorax woolly. Spur of fore tibia clothed with hairlike scales, slender, in the ♂ about half as long as the tibia, in the ♀ shorter. Hind tibia with a short spur basally of the apical pair, hidden in the scaling and usually not noticed. Forewing pointed, three subcostal branches, the first branching off from the cell, the second going into the apex, radial 1 originating close to the subcostal stalk, by which *Aglia* is distinguished from all other Palearctic Saturnids, radial 2 distant from 1, cross-vein directed obliquely backward between the second and third radials, slightly angled, second median branch far beyond the centre; costal margin and costal vein of hindwing almost straight, the latter ending in the apex, subcostal near the first radial, somewhat more proximal than the second median branch, all near the apex of the cell, the cell (as also in the forewing) somewhat club-shaped and only with apical and subapical vein-branches; one inner marginal vein. — Young larvae with two dorsal rows of warts, which are long and thorn-like on the pro- and mesothorax, on segment 11 only one such horn, anal segment with a median thorn at the tip: laterally and dorsally numerous granules bearing small hairs; in the later stages the warts completely obsolescent, but the segments swollen at the corresponding places. Cremaster of pupa sharp transversely, with curved bristles. Cocoon loose, between leaves and moss or below the surface. One purely Palearctic species.

A. tau. ♂ ochreous, with black discal line which is about parallel to the margin; ocellus black dusted
with blue, with white T-shaped pupil, on the forewing smaller below than above, and on the hindwing below
only the T-spot present. Beneath an apical spot on both wings and the basal area of hindwing grey, a brown
median band diffuse distally and vertical to the abdominal edge. ♀ paler than the ♂. Larva green with
light lateral stripes directed obliquely up- and backward, below the stigmata a light longitudinal line with a
reddish edge, the line widened on segment 4 to form a black-centred spot. On deciduous trees, especially
Beech, Oak, Birch, etc. Pupa hibernates. Moth from March to June according to the locality, in the North
later than in the South; the ♂♂ fly by day and are very restless, the ♀♀ remain on tree-trunks and on the
ground. In the Central and Southern districts of Northern Europe, eastward to Japan; not in England and
tau. the Mediterranean countries. — **tau** *L.* (35 a, b). ♂ bright yellow, ♀ pale yellow, upperside without distinct
grey apical mark. From the west coast of France to Transbaicalia. Varies considerably. The interesting
ferenigra. forms which more or less follow Mendel's law are: f. **ferenigra** *Th. Mieg* (= lugens *Standf.*, feranigra *Kirby*)
melaina. (35 a, b); wings black with the exception of the median area; f. **melaina** *Gross* (= melaena *Spul.*), entirely
black (♂) and black-brown (♀), without yellow, but beneath the apical spot of both wings and the basal half
weismanni. of the hindwing light brown. The cross between *melaina* ♂ × *ferenigra* ♀ is f. **weismanni** *Standf.* (= weissmanni
Schultz, Oberth.), which, especially beneath, is still blacker than *melaina*. The offspring of the cross *tau* ♂
cupreola. × *melaina* ♀ are f. **cupreola** *Werner*, the ♂♂ of which are somewhat paler than *melaina*, while the ♀♀ are copper-
red in colour. The following individual aberrations are of lesser interest. Specimens in which the hindwing
cerberus. is black from the margin to the ocellus are ab. **cerberus** *Schultz*; ab. **subcaeca** *Strand*, ocellus without white
subcaeca. caecata. pupil; ab. **caecata** *Schultz*, ocellus normal in the forewing, diffuse in the hindwing; in ab. **ferecaeca** *Oberth.* the
ferecaeca. ocelli are reduced to black dots, the black discal line well developed. In ab. **uniformis** *Oberth.* the black
uniformis. of the ocelli is absent, the white pupil is present, the discal line absent. The blue of the ocelli is absent
decaeruleata. in ab. **decaeruleata** *Schultz*. In ab. **oblongomaculata** *Schultz* the ocelli are oblong. In ab. **flexilis** *Schultz* the
oblongo- black discal line of the hindwing is connected with the anterior edge of the ocellus by a curved stripe.
maculata. In ab. **confluens** *Schultz* the black surrounding the ocellus of the hindwing merges together with the black
flexilis. confluens. discal line. Especially pale coloured specimens are ab. **decolor** *Schultz*. The ♀ is sometimes partly rose-red:
decolor. ab. **roseotincta** *Schultz*. In ab. **quadrangularis** *Schultz* the white spot on the underside of the hindwing is square.
roseotincta. Some specimens in which only one side is abnormal have likewise received names. One wing without ocellus
quadrangularis. (ab. *privata Schultz*); one forewing with small black spot having a white centre and placed in front of the
amurensis. ocellus (ab. *locuples Schultz*). — f. loc. **amurensis** *nov.* The three specimens before me (♂♂) from Amurland resemble
f. *ferenigra*. The forewing is broader, somewhat less produced at the apex; from the base to the ocellus,
at the hind margin and outside the discal line more or less densely scaled with black, the costal margin however much less black than the basal area, moreover the yellow colour in the marginal area remaining distinct
The hindwing either entirely black with traces of the yellow ground-colour or only more or less densely
dusted with black; the marginal area, apart from the broadening of the black line, does not contrast with the
disc. On the underside the basal area of the forewing and the hind margin deeper black than in f. *ferenigra*,
but the costal margin remains yellow, the basal area also yellow with black dusting. The hindwing in the darkest
specimen almost as in f. *ferenigra*, in the lightest one scarcely darker than in ordinary *tau*. Specimens which
japonica. are not distinguishable from European *tau* also occur in Amurland. — **japonica** *Leech* (35 a). In both sexes
the ocellus of the forewing smaller and that of the hindwing larger than in *tau*, ♂ more reddish brown-yellow

than in *tau*, with very distinct grey apical spot on both wings. Forewing with distinct brown transverse line before the middle, weak brown line at the outer side of the ocellus. Discal line but slightly developed, on the hindwing much nearer the ocellus than in *tau*. ♀ much darker and duller buff, outer half of forewing and apex of hindwing more densely sprinkled with black. Antemedian line of forewing more distinct, and discal line thinner than in *tau*, the latter line nearer the ocellus on the hindwing. While in *tau* the pectinations of the antenna bear a long bristle at the tip and a short one on the underside, in *japonica* only the apical bristle is present, which however is often accompanied by a second long bristle. North Island of Japan, May and June. — **homora** *subsp. nov.* The only specimen in coll. OBERTHÜR, a ♀, was figured in Lépidopt. Comp. *homora.* and doubtfully placed with *japonica*. According to the figure the specimen differs from *japonica* in the groundcolour being still darker brown, in the almost obsolescent ocellus of the upper side of the forewing and the smaller ocellus of the hindwing, which is much further from the discal line. Moreover, the discal line of the upperside of both wings in *homora* has a very distinct whitish grey outer edge, and the grey apical spot of the underside of the forewing reaches to the first radial branch, while in *japonica* and *tau* it is bounded by the lower subcostal branch. West China.

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15. Family: **Brahmaeidæ.**

This group comprises about one and a half to two dozen of highly peculiar but very similar species. All are large and rather clumsy moths, with markings so characteristic that they at once catch the eye even in large and mixed collections. The wing is divided into an outer half traversed by ten parallel wavy lines, which on the hindwing directly touches an often uniformly dark basal area, but on the forewing borders on a band which is sometimes modified at the inner margin to form an ocellus-like disc. The basal area of the forewing again contains a number of those peculiar parallel lines, which renders the scheme of markings so confussing, and the biological significance of which we do not yet understand. And as if even Nature could not carry out so complicated a pattern in all its details, we very often find among the *Brahmaeidae* unsymmetrical specimens in which one side bears sometimes one stripe more than the other, sometimes has the dots differently placed. Among a considerable number of otherwise very well developed *B. japonica* before me there is not one specimen the two sides of which agree in every detail.

The position of *Brahmaea* in classification has only changed in that it was sometimes placed among the Saturniids, sometimes among the Bombycids. The larvae, as far as they are known, when full-grown resemble huge larvae of silk-moths, but differ greatly from the latter in the early stages, which shows that there is no close relationship. It will be absolutely necessary to keep the genus *Brahmaea* separate as a distinct family, and it is very noteworthy that a similar phenomenon exists in America, a very homogeneus family in many respects resembling *Brahmaea* also standing alone nearly without transitions and playing the same part in the fauna of the New World as *Brahmaea* in the Old World. These are the Ceratocampids, the largest species of which is produced from that grotesque and strange caterpillar with its curved horns on the thorax which we figure on the cover of each part of this work in a defensive attitude and which perhaps those who are not familiar with the American fauna may have considered a product of the imagination *).

The Brahmaeids are confined to the Old World and are so distributed that three species occur in the Palearctic Region, but not in Europe, just as many forms are Indian, and the same number belong to the Ethiopian fauna. They do not go far north and inhabit mountainous countries, have only one brood in the temperate zone, and as larvae are fairly polyphagous. The larvae grow slowly and pupate in the ground without a cocoon; the moths fly at night, and rest by day on tree-trunks and branches, where, with their wings in steep roof-shape and folded close together, they resemble fruits or pieces of bark. The moths are rather rarely seen, but the larvae are common wherever they occur, and lately large quantities of material for breeding have been imported.

The characters of the family are those of the single genus *Brahmaea*.

1. Genus: **Brahmaea** *Walk.*

Large brown moths with very characteristic markings. Head rather small, frons moderately broad, eyes large, palpi short, obliquely porrect, not reaching the frons, tongue short and functionless; antennae of both sexes bipectinate with rather short branches. Thorax broad and stout, strongly convex, with long thin hair. Legs of medium length and strong, moderately hairy, middle tibia with one, hind tibia with two pairs of spurs. Abdomen conical, smoothly and densely hairy. Both wings rounded, with entire edge, obtuse, with evenly curved margins, more hairy than scaled, especially in the basal area. Veins strong, the basal portion of the subcostal beneath takes the shape of a strong ridge; between it and the median vein a deep longitudinal groove. Frenulum absent. Cell of both wings closed, discocellular of forewing slightly angled, that of the hindwing more strongly so. Cells short, that of the hindwing very short, with a fold. The larvae, when young, with long horns decreasing in length when the larva grows older, otherwise naked, soft, long and not strong; on deciduous trees.

B. certhia *F.* (= undulata *Brem. & Grey*, petiveri *Butl.*) (35 c). Nut-brown to earth-brown, the median *certhia.*
band of forewing strongly constricted between the median branches, in the band itself few or no dots and rings.
The light central line which on the hindwing separates the black basal portion from the wavy marginal area,
is in its costal portion strongly wavy and then proximally convexly produced; in Amurland, North and Central
China. — **carpenteri** *Butl.* is the often somewhat smaller form from Corea, which is not sharply separated. — *carpenteri.*
Ménétriés figures a unicolorous specimen as *lunulata Brem. & Grey*, such as may occur everywhere among
typical specimens. Especially the median band of the forewing is not light at the inner side, but edged by pale
nut-brown waves and is therefore less prominent. — **ledereri** *Rogenh.* (35 c) is the considerably smaller form *ledereri.*
from Cilicia, in which the median band of the forewing is considerably constricted even above the lower median
branch, being sometimes interrupted, and in which this band contrasts sharply and darkly on account of the
bright whitish waves before and beyond it. The entire colouring of *ledereri* is usually also lighter. — Larva

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*) We must, however, add that this caterpillar rests always with the back downward, i. e. hangs on a branch, being represented on the cover in an upright position only for artistic reasons.

grey to blackish, when young with two horns rolled up at the ends on segment 2 and two similar ones on 3; the remaining segments only have small knobs, the anal segment bears an also very strongly curved horn resembling that of the *Sphingidae*. When full-grown the larva is smooth, segments 2 and 3 swollen, on the anal segment a stumpy hump. Markings and colour very variable, frequently confined to a few small black streaks or bright-coloured spiracular dots. According to Staudinger the larvae of the East-Asiatic form are much more brightly marked and coloured than the almost uniformly dark larvae of *ledereri* of Asia Minor. According to Korb the larvae often live in companies of from 20 to 30 specimens and prefer rather sunny sterile localities; until July or August on Privet, Syringa, Ash, Phillyrea and other trees; when disturbed they emit a cracking or crackling noise. They pupate without a cocoon in or on the ground beneath stones; pupa blackish, very strongly glossy, clumsy, stumpy at both ends, deeply incised between the segments, rounded at the abdominal end, the cremaster a short point. The moth appears in June in Eastern Asia.

christophi. **B. christophi** *Stgr.* (35 b). Larger, clumsier, often also darker, but otherwise very like the preceding and perhaps only a form of it. The wavy lines of the upper side of the hindwing less sharp towards the margin, where they are sometimes even almost obsolete, the median line of the hindwing less curved in its costal portion, and less convex towards the base, the basal area intensely and deeply black, especially on the underside. — The larva lighter, almost whitish, with thin black markings, and bright red dots dorsally on segment 3, and red stigmata; shape and first instars as in the preceding. But while the larva of *ledereri* lives gregariously in sunny spots that of *christophi* is found singly in shady woods in damp spots (Korb). Until July on Ash. Pupa with two black knob-like warts on the thorax; very glossy, black; beneath moss, stones, etc. Moth in April and May. From Lenkoran in the Caucasus.

japonica. **B. japonica** *Butl.* (= mniszcchii *Feld.*) (35 c). Smaller than the preceding, more grey and often tinged with greenish. The median band of the forewing is strongly widened in the costal area; lighter and ornamented with small rings. These are nearly always asymmetrical; Leech did not find one symmetrical individual among 15 in Pryer's collection and the same applies to four specimens collected by me. The original of our figure also has on the right forewing (not reproduced) much fewer rings than on the wing figured. The median band also varies rather strongly in its innermarginal portion. Now it is more now less constricted on the lower median vein; but nearly always it forms an ocellus-like disc-patch. The species also varies considerably in the whole *nigrans.* scheme of colouring, and **nigrans** *Butl.*, unknown to me in nature, is probably only a dark specimen. *japonica* is also closely allied to the Indian *conchifera Butl.* and is only a Northern form of *wallichii Gray* (= spectabilis *Hope*), which we figure in Vol. 10, its ground-colour shading into greyish green and that of *rufescens Butl.* into reddish. These latter are Indian forms, which perhaps vary slightly according to locality, but belong to one species. But if Leech places *wallichii* with *certhia*, he is in error. — *japonica* is not rare near Yokohama; occurs also in other localities on Honto, and is also found at Hokkaido.

Alphabetical List

of the Palearctic *Brahmaeidae* with a reference to the original descriptions.

* signifies that the species in also figured in the place cited.

carpenteri Br. *Bull.* Ann. Nat. Hist. (5) 11. p. 111.
certhia Br. *F.* Ent. Syst. 3 (1), p. 412.
christophi Br. *Stgr.* Rom. Mém. Lép. 2, p. 13. *
japonica Br. *Bntl.* Ent. Month. Mag. 10, p. 56.
ledereri Br. *Rghfr.* Verh. zool.-bot. Ges. Wien 23, p. 574.
lunulata Br. *Brem. & Grey*, Motsch. Ét. d'Ent. 1, p. 61.
nigrans Br. *Butl.* Ent. Month. Mag. 17, p. 110.

16. Family: Sphingidae.

The scientific name of this family is derived from the habit of the larvae of many species of affecting a Sphinx-like attitude when being disturbed. The designation "Sphinx" was first used by Réaumur in 1736, who applied it to the Privet-Hawk, and it was adopted by Linnaeus as a suitable generic name. However, in his genus *Sphinx* Linnaeus united the true *Sphingidae* with forms which do not belong here, e. g. the Zygaenids and Aegeriids, and only in quite recent times has one abandoned the old idea that there is a close connection between Linnaeus's true and false *Sphingidae* ("Sphinges legitimae, Sphinges adscitae"). In reality there is indeed no close relationship between the Sphingids and the "adscitae" (the Zygaenids, etc.), but the Hawkmoths have their natural place in a group of families to which the Notodontids, Bombycids, Saturnids, etc., belong. In this group the Sphingids are always distinguishable by the venation, and their general appearance is also so characteristic that only a few species were placed in other families by their first describer (e. g. the African species *Polyptychus mutata Walk.*, and the Australian *Hopliocnema brachycera Lower*). However, the facies is deceptive, and formerly many Notodontids were placed with the Hawkmoths on account of their narrow wings and long conical body. The early stages of the Sphingids usually also have a characteristic shape, especially the horn of segment 11 so seldom appears in other forms that Moore was led to describe a small broad-winged Bombycid as a Sphingid on account of the tailed larva, in which family it still stands in Kirby's Catalogue (*Sorocaba anomala*).

In consequence of an often very far-reaching modification and reduction of organs many species differ considerably from the generally known Sphingid type, as represented for instance by *Herse convolvuli* or *Celerio euphorbiae*, be it as larva, pupa or moth; but the following characters are common to all species of Hawkmoths.

Ocelli and areole absent. Abdomen of ♂ laterally on segment 2 above the sternite with a groove from which a tuft of hair can be extended (scent-organ). Fore tibia with spur on the inner side. Subcostal 1, 2 and 3 of forewing from the cell, 2 and 3 being on a long stalk, 2 often slightly developed and frequently entirely absent, 3 terminating in the costal margin shortly before the apex, subcostals 4 and 5 also stalked, the stalk about half as long as the two branches of the fork, radial 1 from the upper angle of the cell or shortly stalked with the subcostal branches 4 and 5. radial 2 (= vein 5) close before the middle of the apex of the cell, never before the middle and never near the lower angle of the cell; submedian 1 absent, 2 and 3 united, forming a fork at the base; upper angle of cell always more distal than the lower. In the hindwing the costal and subcostal separate from the base, but connected with one another about the middle by an oblique vein (subcostal 1), the costal also closely approaches the subcostal distally of the apex of the cell, subcostal and radial 1 close together or on a stalk, radial 2 (= vein 5) near centre of apex of cell, submedian 1 absent, 2 and 3 present.

The family is distributed over the entire globe with the exception of the extreme northern and southern districts, and most richly developed in the Tropics. We now know about 850 species (not counting the geographical forms, which are reckoned as species by some authors), and of these scarcely 30 have been found in Europe, 23 in Central Europe and 17 in England, among which there are even several species which are only occasional visitors. This small number of species indigenous in our countries is such an insignificant fraction of the whole family that it does not give us a true picture of the development of the Sphingids.

The smallest species is found in Madagascar, (*Sphingonaepiopsis obscurus Mab.*, body 12, forewing 10 mm. long), and the largest in America (*Cocytius antaeus*, body 80 and forewing 90 mm long). We find also in the development of the different organs the same contrast as these two genera show in size, if the entire family is taken into consideration, as a short survey of the variation of the organs will show.

The tongue is usually longer than the body, and in *Cocytius antaeus* attains a length of 250 mm. and in *Xanthopan morgani* (Africa) 225 mm., measurements not reached by any other insect. On the other hand, we also meet with a large number of species the tongue of which is more or less strongly reduced and functionless, and in which it is sometimes only represented by very short lobes. In some species it is hairy, in others naked. The labial palpi are large in typical forms and lie close to the head; segment 2 is broad and 3 quite small; but there are also very much reduced, much lengthened and divergent palpi, and some with hornlike naked third segment. The antennae, generally described as prismatic, have this shape in many species, especially in the ♂; in such antennae the sides of each segment are concave, and around this groove there is a wreath of long thin hairs united in tufts (cilia). The upper edge of the groove is produced into a tooth or a more or less long process in many ♂♂, rarely in ♀♀ (pectinate antennae, e. g. in *Ceridia*); or the anterior and posterior margins may be produced into a long process each, so that we have quadripectinate antennae (*Cressonia*, *Monarda*). In most species the antennae are filiform or setiform; in a great many others, however, distinctly or even strongly clavate, and as a rule they end in a hook. In all ♂♂ with the exception of *Rhopalopsyche* they bear the afore-mentioned long cilia, which also occur in many ♀♀, but are here shortened. Head and thorax often bear a high crest, sometimes double. Very characteristic of the *Sphingidae* are the spines of the abdomen, which are only obsolete in a few species. These spines are found at the apical edge of the segments, and in *Pholus* and *Pachylia*, for instance, where they are very strongly developed, they form a single row; in most species they are placed in several rows, and in many specialised forms the under scales of the underside of the abdomen are also nearly all modified into slight spines: they are often absent on the underside, where they are always less strongly developed than above. Similar structures are rarely found elsewhere among Lepidoptera. These spines may have originated in conjunction with the pupation in the ground.

As regards the legs it is worthy of note that there are frequently spines on the tibiae, these being especially often found in those species which we must consider as specialised on account of the development of the mouth-parts, wings, tarsi and clothing of body. The fore tibia is often produced into a thorn. The hind tibia bears one or two pairs of spurs. At the base of the middle and hind tarsi the spines of one row are often prolonged into long bristles, forming a sort of comb ("basal comb"). In the claw-segment the pulvillus is well developed or reduced or entirely absent, and the same holds good for the paronychium. The fore coxa in the ♂ often has a scent-organ, which sometimes attains a considerable size.

An elongate forewing with entire margin is typical for the family, but many specialised forms deviate from this type and have dentate, lobate or broadened wings, which latter, when the insect is at rest, are not held in roof-shape, but spread out and so placed one above the other that the hindwing protrudes from below the costal margin of the forewing. Sometimes the costal margin is also upturned.

The larva occurs in two chief types, the cylindrical type and the type which is strongly narrowed anteriorly from segment 4. The cylindrical larva is often densely granulose, and sometimes these granules are enlarged to form pointed humps; there are even larvae which on each segment have a belt of branched long spines (*Lophostethus*). The head which is pointed above, and which among the European Sphingids is characteristic of *Smerinthus* and allied genera, is also found among the species allied to *Protoparce*; there are also many genera allied to *Smerinthus* which have round-headed larvae. Often the larva is round-headed in one stage and has a pointed head in the other stages. In the cylindrical larvae oblique lateral bands are the predominant markings, while in the pig-head larvae ocelli prevail. The horn on segment 11 is longer in the early instars than later, and as a rule is also present at first in those species in which it is replaced in the full-grown larva by a small round disc. In many young larvae the horn is as long as the body and directed forward (e. g. in *Pseudosphinx*) and forms a tail moveable at will.

Pupation takes place in or on the ground. But in South America there are species which spin up on the trunks of the food-tree; it may be recalled incidentally that the larvae of *Mimas tiliae* sometimes also pupate in the crevices of the tree on which they have been feeding. Three incisions in the abdomen of the pupa are not fused, so that segments 5 and 6 are moveable. The tongue-case varies greatly in development. Sometimes it does not reach the wing-cases, in most species it extends to their apex, and sometimes beyond it; in many species there would not be enough room for the development of a long tongue in such a sheath running straight from the head to the abdomen. In these cases the base of the sheath is widened, either forming a keel-like enlargement of the head (*Nephele*, *Hippotion*, *Theretra*, etc.), or projecting as a free nose (*Sphinx* and allied genera, also *Rhyncholaba* among the *Chaerocampinae*). The nose is rarely rolled up in a close spiral in several coils (*Cocytius antaeus*), sometimes it is curved and its apex directed forward (*Herse*), or its apex is turned thoracad (several *Protoparce*), or the nose lies along the breast (e. g. in *Sphinx*).

The eggs of the *Sphingidae* are round, somewhat flattened, more rarely slightly pear-shaped. They are usually light green, and the structure of the shell is only visible when greatly magnified. As far as known either the pupa or the moth hibernates, never the larva. In many species which in the temperate zone as a rule have only one brood, a number of specimens emerge in the same year which represent an incomplete second brood. On the other hand, some pupae hibernate twice or even three times, which prevents breeding in and the total destruction of the species in one locality by unfavourable weather.

As to the distribution of the *Sphingidae*, about 320 species are known from the Western Hemisphere, and 530 from the Eastern, about 120 being confined to the Northern Temperate Zone (the Nearctic and Palearctic Regions), while another 70 species occur both in the temperate and tropical districts. 56 species may be considered purely Palearctic, and rather more than 60 exclusively Nearctic. In the Tropics the species are so distributed that the Neotropical, Ethiopian and Oriental Regions each contain about the same number of species. However, so many species are not as yet known from Africa as from Indo-Australia and Central and South America, but in Africa, to judge from the large number of uniques, there are certainly many more species yet to be discovered than in the other regions, so that the difference will be effaced. In any case, there is not such a great difference between the tropical regions as between the latter and the temperate zones.

There is only one cosmopolitan species, *Celerio lineata*; but even this is separated into three well-defined subspecies (one American, one Australian and one African-Asiatic-European). On the other hand, the

Eastern and Western Hemispheres have several genera in common, two being cosmopolitan (*Celerio* and *Herse*) and five Palearctic-Nearctic (*Haemorrhagia, Sphinx, Smerinthus, Sphecodina, Proserpinus*); among the latter *Sphinx* goes as far as the South of the Neotropical Region. Of the Old World Sphingids the highly specialised genera *Haemorrhagia, Cephonodes* and *Sataspes* certainly belong to an American branch which in Central and South America contains a large number of more generalised forms, with which those three single Old World genera of this branch are connected by transitional forms. The genus *Macroglossum*, however, similar in many respects, is a specialised branch of an Old-World stock confined to the Eastern Hemisphere, near the base of which stand *Nephele* and *Acosmeryx*. On the other hand, *Smerinthus, Amorpha* and allied genera of the Palearctic and Nearctic Regions are specialised forms of tropical Asiatic origin, and there are no Sphingids in Tropical America with which these genera have a closer connection. The comparatively large number of *Sphingidae* in the temperate zone in the Pacific area of the Palearctic Region is explained by the absence of a barrier between tropical Indo-China and our Region, in consequence of which many really tropical species are distributed far northward, and also by the large extent of the Eastern Palearctic district.

As the eggs are usually deposited singly or only in pairs on the same plant, one does not generally meet with large companies of larvae. But in particularly favourable years *pinastri* and *ocellata* may be so abundant that they become noxious. Among the tropical forms it is particularly *Pseudosphinx tetrio* and *Erinnyis ello* which often occur in such masses as to defoliate the tree completely.

The 103 species occurring on Palearctic territory, or met with as occasional visitors, are distributed among 43 genera, which altogether contain 370 species.

We divide the *Sphingidae* into two groups:

I. *Sphingidae asemanophorae*: First segment of palpi on the inner side without basal spot of small modified hairs. — Although the palpi are often very large in this group, the basal spot is always absent, while in the second group it is always present even on reduced palpi. The subfamilies *Acherontiinae* and *Ambulicinae* belonging here are very closely allied in structure.

II. *Sphingidae semanophorae*: First segment of palpi on the inner side with basal spot of small modified hairs. — The subfamilies belonging here are *Sesiinae, Philampelinae* and *Chaerocampinae*.

A. Subfamily: **Acherontiinae** *).

This and the following subfamily (*Ambulicinae*) are not separated by any one single character occurring in every one of the numerous species. In both subfamilies there are many forms so strongly reduced as to lose the structures peculiar to the *Acherontiinae* or *Ambulicinae*. But the connection of such species with the less specialised genera of this or that particular subfamily is so obvious that in scarcely any species is there any doubt as to whether it should be placed into the one or the other subfamily.

The end-segment of the antennae is long and slender in the *Acherontiinae*, except in the peculiar small tribe *Sphingulicae* and the reduced South African *Oligographa*. The apex of the forewing is always pointed, but never produced in sickle-shape, also never truncate or sinuate; the outer margin is at most slightly wavy, never dentate, lobate or angulate. The frenulum is always present. Hind tibia always with two pairs of spurs with the exception of the genus *Thamnoecha*, which only contains one reduced species. Forewing neither above nor below with bright red or yellow ground-colour.

a) Tribe: **Acherontiicae.**

Second palpal segment concave on the inner side, and this cavity covered with a roof of scales. — Only a few genera belong here.

1. Genus: **Acherontia** *O.*

A genus highly specialised in many respects, containing three Old-World species. They all bear a death-head mark on the upper side of the thorax, which mark is not so well developed in any other Hawkmoth, but is indicated in many species of *Acherontiinae*, e. g. in the African *Coelonia fulvinotata* and *Xanthopan morgani*, and the American *Protoparce rustica*.

The tongue is shorter than the thorax, stout and hairy; a similar tongue is not found anywhere else among the *Sphingidae*, and this peculiarity of development leads to the supposition that it has to fulfil a particular function. Probably this consists of the ability of the moth to pierce the lid of the honey cells of wild and domesticated bees, on account in the strength of its tongue. The palpi do not touch each other and the base of the tongue is therefore visible between them; this also occurs in other Sphingids (e. g. the genus *Cechenena*, which belongs to a different subfamily). The antennae are stout, and considerably shorter than the forewing is broad; in the ♂ only slightly slenderer towards the base. Body stout, with woolly scaling. Hind tibia with two pairs of spurs; middle and hind tarsi strongly compressed, without ventral brush of long brist-

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*) As regards the nomenclature it is necessary to state that for the subfamilies, genera, etc., only such names are regarded as coming under the law of priority which were accompanied by a description, and that for the subfamily and tribe the first name conforming to this rule was retained even when the generic name has become a synonym. Hereby on the one hand the frequent change of the names of the families and subfamilies is avoided, and on the other hand the groundless erection of new families and genera prevented.

les at the base; the true pulvillus is absent, and the paronychium reduced to form a short stumpy lobe on each side. Subcostal 4 of forewing downcurved distally, therefore terminating in the outer margin; the upper scales of the forewing broad, with many teeth, those of the hindwing longer and partly piliform. Clasper of the ♂ on the outer side with a patch of large multidentate friction-scales; harpe short, with two teeth. — Egg greenish or slightly bluish. Larva at first whitish, in the later stages usually green, but also often yellow or greyish brown; from segment 4 onward with oblique stripes, which, especially in light specimens, are edged with yellow and blue and stand out sharply, but on the other hand are les sconspicuous in brown specimens. The colour of the larva depends often on its food. Horn of young larva straight and about half as long as the body, later on much shorter, roughly granulose, and curved in S-shape. Pupa smooth without prominent tongue-case, in the ground in a moderately hard cell. Food-plants: particularly Solanaceae, but also many other families. The moth, when disturbed, emits a rather loud sound (also the moth in the pupa) which recalls the stridulation-sounds of other insects; it is not produced by friction, but by the ejection of air through the tongue. This chirping noise is known also of some other species of *Sphingidae asemanophorae*, e. g. *Coelonia fulvinotata*, *Pseudoclanis postica*, *Langia zenzeroides*.

The three species are essentially tropical, but all extend beyond the southern boundary of the Palearctic Region, two of them (*atropos* and *styx*) being found far to the North. The moths are good fliers and wander far from their homes. They come to the light and also visit flowers, and in their localities are as a rule abundant. In markings they are very much alike, and as the African-European "Death-Head moth" is so well known we confine ourselves to the description of the differences of the three species. With the exception of the tongue, *Acherontia* is very closely allied to the African genus *Coelonia* in all stages.

lachesis. **A. lachesis** *F.* (= morta *Hbn.*, satanas *Bdv.*, lethe *Westw.*, circe *Moore*) (36 a). Hindwing with large black basal area, which is absent in the other two species. Antennae longer than in *atropos*, and in the ♀ distinctly slenderer than in the ♀ of that species. Harpe of ♂ with two parallel hook-shaped teeth. The larva until the last change of skin green, with black markings, more rarely brown, the three anterior segments yellow without markings; the dark, yellow edged, lateral oblique stripes continued in a bluish colour until they meet dorsally. Pupa bright dark reddish brown. — Distributed from India to the Moluccas and known northward to Northern China. Quite as variable as *atropos*.

atropos. **A. atropos** *L.* (= solani *Oken*, sculda *Kirby*, atropus *Swains. & Schuck.*) (36 b). Hindwing without black basal area. Underside of abdomen with black transverse bands at the bases of the segments. Antennae shorter than in the other species, especially in the ♀. Tibiae also somewhat shorter, the middle tibia shorter than the first segment of the tarsus: fore tarsus exteriorly with numerous spines, which form more than one row on segments 2 and 3. The species is distributed over the entire Ethiopian Region, and in the Palearctic Region goes westward as far as the Azores, northward to the Shetlands and Lofotes, and eastward to Northern Persia and Transcaucasia. In the northern districts it is only a chance visitor, appearing almost annually in the summer, without establishing itself. In North and Central Europe also *atropos* has not yet settled permanently. The moths appearing in the autumn are usually unfertile, this being also the case in many other moths which normally only emerge after hibernation. *atropos* has only become common in Europe since the introduction of the potato. The larva is sometimes infested by Tachinids, but seems to be still avoided by European Ichneumonids. Specimens from Tropical and Southern Africa, Madagascar, etc., do not differ from European ones. In a migratory species like this the breaking up into local races is impossible. But the moth varies considerably individually, and the following names have been introduced for specimens
obsoleta. differing from the average. In ab. **obsoleta** *Tutt* the death-head mark is more or less completely absent. The
imperfecta. black median band of the hindwing is absent in ab. **imperfecta** *Tutt*, in ab. **conjuncta** *Tutt*, however, it is
conjuncta. *extensa.* so much widened that it is confluent with the submarginal band. In ab. **extensa** *Tutt* the latter band is ex-
flavescens. tended to the margin. In ab. **flavescens** *Tutt* the ground-colour of the hindwing is pale yellow. In ab. **variegata**
variegata. *Tutt* the black dusting of the forewing is nearly confined to two bands which correspond to the bands of the hindwing, while the rest, like the dorsal stripe of the abdomen, is more or less whitish. Specimens which differ
virgata. from ordinary ones especially in the more distinct whitish lines of the forewing are ab. **virgata** *Tutt*. In
suffusa. ab. **suffusa** *Tutt* the wings and body are irrorated with dark, so that the markings appear suffused, and the
intermedia. yellow colour of the hindwing and abdominal spots is suppressed to a great extent. ab. **intermedia** *Tutt* are specimens with distinct whitish transverse markings on the forewing, which are not, however, visible
charon. to the hind margin as in *virgata*. In ab. **charon** *Closs* the black discal band of the hindwing is anteriorly forked in consequence of the development of yellow spots in the band. — Larva similar to that of *lachesis*; also very variable both in the brown and green forms; the former usually with less markings, in the latter the first three segments usually bright yellow. Pupa very dark brown.

A. styx. The death-head mark narrower in front than in the preceding species and laterally less dark. The abdomen ventrally bears a median row of black spots instead of transverse bands. The antennae are longer and slenderer than in *atropos*. The foretarsus has fewer spines exteriorly than in *atropos* and *lachesis*. The hind tibia is as long as segments 1 to 3 of the hind tarsus, while in *atropos* it only equals segments 1 and 2 in length. The forewing is more evenly marked than in the other species. The harpe of ♂ with two short processes, the lower one of which, instead of being directed straight backward, stands nearly vertically on the surface of the valve, and is upturned at the apex. The larva of *styx* varies just as strongly as those of the other species, which it strongly resembles, apart from its smaller size. From Japan to Ceylon and eastward to the Moluccas, two subspecies. — In **styx** *Westw.* (= medusa *Moore* pt.) the forewing bears *styx.* longitudinal rust-brown stripes, and distally of the white discal lines an undefined large patch of the same colour. Ceylon to North India, and from there southward to Tenasserim. — The rust-brown colour of the afore-mentioned markings is only indicated or entirely absent in **crathis** *R. & J.* (= medusa *Moore* *crathis.* pt.) (36 a). Japan and China, also known from Malacca to Ceram and Kisser. Its variability corresponds to that of *atropos*; specimens differing from the average have not yet received names.

2. Genus: **Herse** *Oken.*

Some of the 5 species which belong here are usually found in manuals under *Protoparce*. The genotype of *Protoparce Burm.* (1856), however, is *rustica* and is not closely allied to *convolvuli*.

Tongue longer than the body and gradually pointed at the apex. The cavity on the inner side of the second palpal segment deep and covered with large scales. Antennae in the ♂ of nearly equal thickness from the base to the recurved apical hook, in the ♀ club-shaped, in both sexes with white scaling above. Tarsi slender, not compressed as in *Acherontia*; middle and hind tarsi with basal brush on the underside of segment 1. Pulvillus very small, paronychium with one lobe at each side. Clasper of ♂ on the outer side with a patch of multidentate friction-scales; harpe as in *Acherontia*, short and divided into two teeth at the apex. — Egg small; horn of larva almost smooth, simply curved, its apex not upcurved as in *Acherontia*; beside the usual oblique stripes of this group the larva bears a subdorsal stripe reaching from the pronotum to the horn; larva dichromatic nearly as in *Acherontia*, green, or brown to nearly black. Pupa distinguished by the sheath of the proboscis being curved spirally towards the head. The moths are good fliers and sometimes travel long distances. The distribution-area of two of the species is consequently very large, *cingulata F.* being found throughout the Western Hemisphere with the exception of the extreme north, and *convolvuli* occurring from the Atlantic Islands to New Zealand, neither species having any even fairly constant local form anywhere. Neither lofty mountains nor wide straits are unsurmountable obstacles for these moths. The other three species inhabit the Papuan district and only one of them (*luctifera*) goes westward to Celebes.

H. convolvuli *L.* (= orientalis *Butl.*) (36 a). As in the other species of this genus the forewing of the *convolvuli.* ♂ is much more strongly marked above and darker than in the ♀, in which sex it is almost uniformly grey. Abdomen with red transverse spots laterally. Hindwing grey with black transverse bands. The variable larva on Convolvulaceae; subdorsal lines and lateral stripes yellow. The pupa hibernates. The moth very common in the tropics of Africa and Indo-Australia; in districts with a long dry season the specimens are as a rule small and pale. European examples are usually larger than tropical ones. In the summer the Convolvulus Hawkmoth goes far north and is found at dusk sucking at flowers, among which it particularly frequents the species of Phlox and Tobacco so rich in honey. In the Southern districts of the Palearctic Region it is met with during nearly the whole warm season of the year, in Central Europe in the late spring and more often again late in the summer. In Northern Central Europe, just like *atropos*, it is not permanently acclimatised. The ♂-ab. **alicea** *Neuburger* is very *alicea.* dark, the abdomen not grey but golden brown, the lateral spots being red-gold without white edges. It is perhaps advisable to use this name for all specimen of both sexes having yellow abdominal spots instead of red ones. Small and fairly uniformly coloured specimens are ab. **pseudoconvolvuli** *Schauf.* (= batatae *Christ.*): *pseudo-convolvuli.* they are especially common in tropical regions. Specimens which are larger than 120 mm. Tutt calls ab. *major* and those measuring less at than 75 mm. ab. *minor*. Moreover, he divides the specimens known to him from Europe, Asia and Africa into 8 groups, the names of which we mention here for the sake of completeness. Unfortunately Tutt does not mention to which sex he is referring, and some of the names evidently only refer to ♂♂ and others only to ♀♀. ab. *unicolor Tutt*, forewing uniformly grey, without distinct transverse bands (♀?); ab. *grisea Tutt* similar, but darker grey; ab. *intermedia Tutt*, forewing pale grey as in *unicolor*, with darker transverse lines; ab. *fuscosignata Tutt*, forewing dark grey with distinct brown median area; ab. **virgata** *Tutt*, forewing dark grey, the median area much darker than the rest of the wing; ab. *varie-* *virgata.* *gata Tutt*, forewing with dark central and marginal areas contrasting with the whitish basal and discal areas; ab. **suffusa** *Tutt*, forewing dark, the grey markings confined to the neighbourhood of the proximal and discal *suffusa.* wavy lines; ab. **obscura** *Tutt*, the darkest form, the light markings of the forewing almost entirely obsolete *obscura.* Of these eight names the first three are best placed with *convolvuli*, and *variegata* united with *virgata*.

2. Tribe: **Sphingicae.**

Second palpal segment not concave on the inner side and scaled in a normal way, at most with a bare stripe. — Only two of the 120 known species occur in Europe, and 8 altogether on Palearctic territory.

3. Genus: **Meganoton** *Walk.*

A purely Oriental genus comprising four species, two of which occur in our area. Large; tongue very long, longer than the body. Antennae long and slender, terminating with a long thin hook. Palpi large, segment 2 nearly as broad as it is long, when seen from above with a broad end-surface. Legs long, tibiae without spines, but with long spurs, the longer apical spur of the hind tibia about three-quarters the length of the tibia; middle and hind tarsi with long basal bristles, hind tarsus more than twice as long as the anterior edge of the cell of the hindwing; fore tarsus without prolonged bristles. Pulvillus and paronychium present, the latter having two lobes on each side. The clasper of the ♂ has a patch of friction-scales on the outer side. Larva and pupa known of only one species (*nyctiphanes*): the former with S-shaped curved granulose horn (similar to that of *Acherontia*); metathorax with conical median hump. Tongue-case of pupa free, curved, but not curved frontad spirally as in *Herse*.

analis. **M. analis** *Feld.* (36 c). Upperside of body and forewing grey, the hindwing and dark markings of forewing and abdomen walnut-brown, underside of body and first segment of palpi greyish white, wings pale walnut-brown with grey base. Forewing above with distinct white discocellular dot lying in the anterior broad portion of the antemedian transverse band, between the lower radial and upper median branches a longitudinal streak, which is connected with that band and distally reaches to an elliptical submarginal spot; between the cell and margin four transverse lines, the first two of which are more or less confluent, the third one slightly developed, the fourth widened anteriorly and here connected with the broad apical oblique stripe. Hindwing with whitish grey markings before the hind margin and at the anal angle. The anal tergite of the ♂ divided into two long slender processes, while the sternite is prolonged into a single long slender process; harpe broadened and rounded at the apex; sheath of duct with pointed apical process which is directed frontad and lies on the sheath. — Shanghai; Northern India; rather rare.

scribae. **M. scribae** *Aust.* Smaller than *analis*, to which *scribae* is allied in structure, especially of the genitalia; thorax anteriorly not darkened; the two brown lateral stripes of the abdomen so broad that the greyish white spots lying between them are smaller than in *analis* and more or less separated one from the other; underside of body and first palpal segment almost pure white. Forewing above without white discocellular spot, markings otherwise very like those of *analis*, but blacker, and between the third radial and lower median branches there are two very broad longitudinal streaks which are only separated by the first median branch and, as in *analis*, join distally an elongate submarginal spot; apex marked nearly as in *analis*; anal angle of both wings less produced than in *analis*, the outer margin more convex. Hindwing somewhat more blackish than in *analis*, the grey markings reduced. Underside of both wings brownish grey, without the walnut-brown tint of *analis*. As in *analis* the two processes of the anal tergite of ♂ long, slender and widely separated in contradistinction to *Psilogramma menephron*, in which they lie close together. Paronychium with two lobes on each side. Japan and Corea; two ♂♂ in the Tring Museum, one ♀ in coll. Austaut, a second ♀, from Corea, ALPHÉRAKY has figured in Rom. Mém. Lép. IX, plate 13 and placed with *Psilogramma menephron increta Walk.*

4. Genus: **Psilogramma** *R. & J.*

Very like the preceding genus, but the second palpal segment has on the inner side a longitudinal bare stripe, which is not present in any other genus. The antennae are shorter and have a proportionately shorter hook. The paronychium consists of only one lobe on each side. The clasper of the ♂ has a patch of modified entire friction-scales on the outer side, and the harpe is only indicated. — Larva dichromatic, a green form with white oblique lateral stripes, and a dark one with broad brown longitudinal stripe dorsally and large brown spots beneath and at the sides; head minutely granulose, thoracical segments each with a transverse row of small conical humps; horn roughly granulose, almost straight, slightly upcurved; anal segment also roughly granulose, with brown edges; stigmata dark red. On Anona, Ligustrum, Spathodea, etc. Pupa in the ground, dark red-brown dusted with bluish grey; tongue-case long, free, curved, but not spiral, with the end directed thoracad. — Two species, one of which goes north to Japan in the east of the Palearctic region.

P. menephron. This species is very variable in the tropical districts of its area of distribution and has received numerous names. It resembles *Meganoton scribae*, but the discal streaks of the forewing and the
increta. apical arcs are thinner. From Japan to Ceylon and eastward to New Caledonia; abundant everywhere. — **increta**
Walk. (36 b) is pale grey; the markings of the forewing are thin. Japan, Liu-Kiu Islands, Corea and North
menephron. and East China. Varies comparatively little. — **menephron** *Cr.* The specimens from Central and Western China on the whole agree with Indian ones, and like these are very variable in ground-colour and in the thickness of the transverse lines and longitudinal streaks. Very light specimens occur which can scarcely be distinguished from *increta*, and dark ones which are connected with the light ones by transitions. These tropical forms, which are so different in appearance, will be more fully dealt with in Vol. X.

5. Genus: **Sphinx** *L.*

In our Revision of the Sphingidae (1903) we have dealt with this genus under the name of *Hyloicus Hbn.* According to more recent suggestions of the Committee on Nomenclature of the International Zoological Congresses it is advisable to select by tautonomy the type of genera whose type had not been fixed by the author. In our case LINNAEUS only mentions the name *Sphinx* in the literature quoted by him under *ligustri* and according to the above principle this species would be the genotype. As hereby the name *Smerinthus*, which has been in use for so long, will be saved for *ocellata*, the new principle advocated by the Committee will be welcomed by many, although it is antagonistic to the law of absolute priority.

The 30 species which we place into this genus are distinguished before all the other *Sphingicae* by the fact that at least the fore tibiae are spined and the pulvillus is at the same time absent, while the abdomen bears grey-white, red or very slightly yellowish lateral spots, the pupa has a free tongue-case lying on the breast, and the head of the larva is rounded in all stages. Sheath of duct of ♂ with apical process. — Larva not dichromatic as in *Acherontia* and *Herse*; the horn simply curved, pointed; the head sometimes narrowed above, but never pyramidal as in *Lapara* (the first stage of which, however, also has a round head). The five Palearctic species probably all have one brood only and hibernate as pupa in a cell in the ground or in moss. The other 25 species belong to the American fauna. The genus, which is derived from the large and purely American genus *Protoparce*, is absent in the Indo-Australian and Ethiopian Regions. The five Palearctic species are closely allied to certain North American forms. These species of *Sphinx*, therefore, occupy a similar position in the Old World fauna to that of the Old World genera *Cephonodes* and *Sataspes* and the Palearctic species of *Haemorrhagia*, which are also specialised branches of an American stock. It is not advisable generically to separate *ligustri* and *pinastri* (REBEL, TUTT, STAUDINGER), as such a proceeding would entail the erection of quite a number of genera for the other 28 species. But on the other hand there is no justification for placing these two European species with *convolvuli* (SPULER), as consequently nearly all the other *Acherontiinae* would have to be placed in the same genus, which would render a classification according to relationship illusory.

S. ligustri. Abdomen with red lateral spots, hindwing also red with two black transverse bands and a short oblique subbasal one. Harpe of ♂ broad, undivided. Two local forms: — **constricta** *Butl.* (= amurensis *constricta.* *Oberth.*, spiraeae [Esp.] *Graes.*) (36 c). A small form on an average, in which the black bands of the hindwing are more or less confluent and the red colour of the hindwing and abdomen is pale. North China, Amurland and Japan. June and the beginning of July, rather rare in collections; larva on Spiraea. — **ligustri** *L.* (36 c). *ligustri.* With rare exceptions the abdominal spots and the ground-colour of the hindwing are bright rose-red, also the median black band of the hindwing is usually separated from the outer band. We have not found structural differences between *ligustri* and *constricta*. Western Europe to Asia Minor and Central Asia. The following names of aberrations must be mentioned. ab. **spiraeae** *Esp.*, small, pale, subbasal band of hindwing absent; *spiraeae.* larva found on Spiraea chamaedrifolia. In ab. **albescens** *Tutt* the red colour of the hindwing and abdomen *albescens.* is nearly white, while these portions are pale lemon-yellow in ab. **lutescens** *Tutt.* ab. **obscura** *Tutt* are much *lutescens.* blackened specimens. In ab. **rosacea** *Rebel* the costal area of the forewing is bright rose-red. In ab. **brunnea** *obscura* *rosacea.* *Tutt* the usually pale costal area of the forewing and the ground-colour of the hindwing are dusted with brown. *brunnea.* Besides these forms TUTT names some intermediate forms (ab. *pallida*, ab. *subpallida*, ab. *incerta*, ab. *typica*, ab. *intermedia*). The moth common in most localities from the end of April to July, in the Southern districts again in the autumn (early specimens, not second brood); in the East much rarer than in Central and Western Europe. In the whole Palearctic Region northward to Scotland and Scandinavia; the records from the Azores, Canaries and North Africa require confirmation; not recorded from Greece. In the evening at flowers and the light. — Egg light green. Larva green, horn dark, in the first stages half as long as the body, and as in the allied species forked, later on simply curved downwards; 7 oblique stripes laterally, an eighth indicated, all purple and white, but varying slightly in the shade of colour. On Ligustrum, Spiraea, Fraxinus, Syringa, Viburnum, etc. Pupa in a cell in the ground, tongue close to the thorax, up to 8 mm. long; cremaster with two small points at the apex and two before it.

S. pinastri. Grey, patagia with black stripe, abdomen with light grey lateral spots edged with black. On the forewing two transverse bands converging behind, a few black discal longitudinal streaks and an oblique apical streak black; hindwing almost uniformly grey. Fringes of both wings chequered with white. Antennae distally distinctly widened. Spines of tibiae small and not numerous; spurs of hind tibia long. Harpe of ♂ bipartite. Vaginal orifice of ♀ central, not proximal as in *ligustri*, before the orifice a lobate process, which it absent in *ligustri*. Single specimens have been found in the United States and described as *saniptri Streck.*; they do not differ from European examples and have probably been accidentally imported. BUTLER also described a specimen as *asiaticus* with the locality Scinde, which also does not differ from *pinastri* and was probably erroneously labelled as coming from Scinde (India). On the other hand, in a collection of Japanese Lepidoptera bought by us in London we found a ♂ of this species which differs considerably from all other ♂♂: *morio.* **morio** *R. & J.* (36 d). Small, the light abdominal spots reduced, upper side of thorax, of abdomen and wings as well as the palpi darker than in typical *pinastri*; the subcostal and upper radial of hindwing on a quite short stalk. The upper process of harpe flat, not rolled up cylindrically as in typical *pinastri*, the apical process of the sheath of the duct pointed and almost hooked. A ♂ from Japan, without definite locality. — *pinastri.* **pinastri** *L.* (36 d). The white and black abdominal spots as a rule sharply prominent. Middle of thorax and abdomen grey, the latter with a thin black median line. The forewing bears two transverse bands, discal longitudinal streaks and an apical streak. But the markings and general colouring vary considerably. *fasciata.* In ab. **fasciata** *Lampa* the two bands of the forewing are broad, separated, and the longitudinal streaks are absent. *typica-virgata.* In ab. **typica-virgata** *Tutt* (= albicans *Aust.*) the ground-colour is light grey to greyish white, the longitudinal streaks are present and the two bands merged together to form a single one. *virgata.* ab. **virgata** *Tutt* differs from it in the absence of the longitudinal streaks. *brunnea.* In ab. **brunnea** *Spul.* the ground-colour of the body and wings is deep brown, but the light lateral spots of the abdomen remain well developed. *fuliginosa.* ab. **fuliginosa** *Lamb.* like *brunnea*, abdomen without white spots, the middle discal longitudinal stripe of the forewing encloses an elongate spot of the ground-colour in the centre. Uniformly brown specimens almost without markings *unicolor.* are ab. **unicolor** *Tutt* (36 b). Grey specimens without bands on the forewing, but with dark central spot *grisea-mediopuncta.* are ab. **grisea-mediopuncta** *Tutt.* Beside these Tutt also named two intermediate forms (ab. *grisea-transversa* and ab. *grisea-distincta Tutt*). — Egg 2 mm long, light green, deposited on the needles of the food-plant singly or in small clusters. Young larva pale green, with dark head, the following stages green (more rarely brown), with brown and red, sometimes yellow, longitudinal stripes, without oblique bands; sides of head, the horn and anal segment granulose. From June until the autumn, sometimes occurs in rather large numbers so that the species is placed among the insects injurious to forests, but it is never found in such masses as, for instance, *Lymantria monacha.* Pupa in moss or in the ground near the tree-trunk; less glossy than that of *ligustri*, and more wrinkled; tongue-case short, as in *ligustri* lying on the breast. Sometimes hibernates twice. The moth from the spring into the summer, by day on the trunks of firs, usually only one or a few yards above the ground, at dusk it begins to fly and to visit flowers, especially frequenting Lonicera and Saponaria.

S. caligineus, from Japan and China, is usually (but erroneously) regarded as an Eastern form of *pinastri*. Smaller than *pinastri*, uniformly grey, abdomen with dark grey lateral spots, forewing with an often absent line across the apex of the cell. Tibiae with fewer spines than in *pinastri*, the longer of the two apical spurs of the hind tibiae less than half as long as the first segment of the tarsus, while this spur of *pinastri* is at least equal to two-thirds the length of this segment. The two apical processes of the harpe of ♂ shorter than in *pinastri*. *caligineus.* The anal sternite not completely divided as in *pinastri*. Earlier stages not known. Japan and China. — **caligineus** *Butl.* (= caliginosus *Kirby*, err. typ.) (36 d). Dark grey; patagia with dark edge. Longitudinal stripe on disc of forewing distinct. Japan, on the North, Main and South Islands, in July and August, common. *sinicus.* — **sinicus** *R. & J.* Paler grey, more like *pinastri*. The dark edge of the patagia and the longitudinal stripe of forewing slight, or the latter entirely absent. Scaling of antennae white, subcostal and upper radial of hindwing on a shorter stalk than in typical *caligineus*. The genitalia also distinctly different from those of the Japanese subspecies. China: Shanghai and Zoçé.

oberthueri. **S. oberthueri** *R. & J.* (36 d). Lateral spots of abdomen white, narrow. Wings much narrower than in the preceding species; the fringes as in *pinastri* with very distinct white spots. Otherwise not essentially different in markings and colour from *pinastri* and *caligineus*. Tibia almost without spines, spurs short, the longer apical spur of the hind tibia only one-third as long as the first segment of the tarsus. Harpe of ♂ with two short apical processes, which are separated by a round sinus, the upper process with one or more teeth, the lower one thinner, almost conical and slightly curved. Only ♂♂ known. — Tse-kou, West China, in coll. Charles Oberthür and the Tring Museum.

crassistriga. **S. crassistriga** *R. & J.* (42 f). Edge of patagia broadly black, abdomen with black dorsal line and black lateral spots. Forewing grey brown, with black-brown markings, viz., two transverse lines which cross the apex of the cell and extend to the hind margin of the wing, several faint discal lines which, although running from the costal to the hind margin, are only distinct posteriorly, on the disc three longitudinal stripes, the upper one of which is short and faint, the second long and broad, and the third somewhat shorter and also broad. Fringes of both wings spotted with white. Hindwing dark brown. Only one ♀ known, from Japan, probably from the Main Island; ex. coll. Leech, in the British Museum. The vaginal orifice proximal as in *ligustri*. The specimen resembles the species of *Kentrochrysalis* and also recalls *Psilogramma menephron increta*.

C. Tribe: **Sphingulicae.**

In contradistinction to the preceding forms the end-segment of the antennae in the following genera of *Acherontiinae* is always short. The tongue at most attains half the length of the body, and is often weak and functionless. The spines of the abdomen are always weak and are usually entirely absent on the underside. Pupa without free tongue-case; larva granulose. — We here unite a number of reduced forms which as larva, pupa and moth in many respects resemble the following subfamily. The species are all Asiatic or Australian.

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*) The collection also contained the afore-mentioned (p. 186) two *Meganoton scribae*.

6. Genus: **Dolbina** *Stgr.*

Thorax stouter than in the following genera; the abdomen above more strongly spinose and beneath furnished with weak spines. The antennae stout, gradually pointed distally, also in the ♀ with lateral grooves and prolonged cilia. Fore and mid tibiae without spines, spurs short, hind tibia with 2 pairs, fore tibia without apical thorn, pulvillus present, paronychium with two pairs of lobes on each side. — Larva and pupa (of *exacta*) according to Graeser so like those of *ocellata* that they can hardly be distinguished.

One Indian and two Palearctic species are known as yet. They are very similar in markings and colouring, but are easily distinguished by their structure. Upperside of body and wings greyish black, often greenish; abdomen with a dorsal row of black streak-spots and black lateral spots; underside of body lighter. Forewing above variegated with white, two parallel proximal lines and several discal ones dentate and black; a discocellular dot white, hindwing almost uniformly greyish black, lighter at the anal angle. Sexes similar.

tancrei. **D. tancrei** *Stgr.* (36 c). Abdomen beneath with large black spots in the middle of the segments. — Amurland and Japan; some of the specimens before me were caught in June and August.

exacta. **D. exacta** *Stgr.* (= tancrei *Stgr.* pt., inexacta *Fixs.* nec *Walk.*) (36 e). Abdomen beneath with small black central spots. Larva found by Graeser on Syringa and Fraxinus. Two broods annually; the moth in the spring and from August onward. — Amurland, Japan, Corea and Central China, more abundant than the preceding species.

The third species, *D. inexacta Walk.*, occurs in North India, and in the North-West extends close to the Palearctic Region. It is larger than *exacta* and *tancrei*, and has very large black spots on the underside of the abdomen.

7. Genus: **Dolbinopsis** *R. & J.*

A reduced off-shoot from *Dolbina*. Palpi still smaller, fore tibia with naked end-thorn; pulvillus absent, paronychium just indicated; fore and middle tibiae without spines; hind tibia with two pairs of very short spurs; subcostal and upper radial of hindwing separate. — One species.

grisea. **D. grisea** *Hamps.* Markings and colour almost entirely as in the species of *Dolbina*, from which *grisea* is easily distinguished by the apical thorn of the fore tibia. Only a few ♂♂ known. — Kulu, North-West India (British Museum).

8. Genus: **Kentrochrysalis** *Stgr.*

Thorax slenderer than in *Dolba*, conical. Tongue quite short and weak, with long cilia at the inner edge of each half. Palpi small, especially in the ♀, the joint between segments 1 and 2 visible (bare). Antennae long, in ♂ and ♀ with prolonged cilia, which are however much shorter in the ♀ than in the ♂, the segments slightly widened laterally. Tibiae without spines; spurs short, hind tibiae with two pairs; pulvillus and paronychium present. — Larva granulose as in *Smerinthus*, with conical head. Pupa with a few high and sharp humps on the underside. — A purely Palearctic genus with three species.

streckeri. **K. streckeri** *Stgr.* (= davidis *Oberth.*) (36 e). Head, thorax and forewing grey, abdomen and hindwing more brown, thorax above striped with black, abdomen with black dorsal line of spots and black lateral spots. Forewing with a proximal and a discal pair of brown-black dentate transverse lines, a white discocellular dot, black longitudinal discal stripes, which are sometimes absent, and a black oblique apical line. Hindwing uniformly brown, paler towards the base and at the hind margin. Fringes of both wings chequered with black and white. Anal sternite of ♂ short and broad, slightly emarginate, harpe with broad bipartite process directed dorsad and long narrow horizontal apical process. Larva on Fraxinus and Ligustrum, fairly common, e. g. near Vladivostok, according to Graeser similar to that of *S. ocellata*. The very peculiar pupa is able to crawl forward fairly fast with the help of the pointed abdominal processes by moving the abdomen quickly from side to side (Graeser). Amurland.

consimilis. **K. consimilis** *R. & J.* (36 e). In shape and markings similar to *streckeri*, the inner transverse lines of the forewing more strongly developed and ending posteriorly in a blackish smear which is prolonged basad; the outer transverse lines are less distinctly dentate than in *streckeri*. In structure, however, *consimilis* is more closely allied to the following species. Anal sternite of ♂ deeply cleft; harpe longer than the clasper, dorsally with several short processes, apically with two. — Japan, on the Main Island, in August, and certainly also in the spring from hibernated pupae.

sieversi. **K. sieversi** *Alphér.* (37 a). Larger than the preceding species. The large black spot which is found on the upperside of the antennae of those species is only slightly indicated in *sieversi*. Body and forewing above darker; the forewing broader, with larger white discocellular dot and broader apical oblique line. Palpi smoothly scaled, not rough-haired. Harpe very broad, reaching nearly to the dorsal edge of the clasper, with several short dorsal processes and two apical ones, the lower one of which is longer than in *consimilis*. — Amurland and Corea, rare. The ♀ not described and perhaps not yet in collections.

9. Genus: **Sphingulus** *Stgr.*

A reduced off-shoot of *Kentrochrysalis*. Forewing more rounded. Palpi smaller; paronychium atrophied. Hind tibia with two pairs of very small spurs. — One species.

mus. **S. mus** *Stgr.* (37 a). Uniformly grey, with very slight markings. — Amurland (Ussuri, Suifun, etc.), in June; the early stages not yet described.

2. Subfamily: **Ambulicinae.**

Like the *Acherontiinae* always without basal spot on the inner side of the first palpal segment. Middle and hind tarsi always without basal comb of prolonged bristles, this comb being present in most *Acherontiinae*. Tongue never longer than the body, as a rule short, weak and functionless. Antennae never incrassate towards the apex, often dentate or even pectinate: end-segment short, except in the four genera *Compsogene*, *Oxyambulyx*, *Protambulyx* and *Cypa*, of which only *Oxyambulyx* is represented on Palearctic territory. Spines of abdomen always weak, and nearly always absent on the underside, only a few of the least reduced forms like *Oxyambulyx*, *Protambulyx* and allied genera have a small number of spines beneath. In the more generalised forms the forewing is slender, produced at the apex, truncate or emarginate. The outer margin is often dentate, lobate, angulate or deeply sinuate below the apex. the longitudinal stripes so often occurring on the disc between the radial and median branches in the *Acherontiinae* are never present.

The larvae are granulose, sometimes even furnished with such long spines as to render them similar to the larvae of *Saturniidae* (*Lophostethus*, short spines in *Rhadinopasa*). The head is usually narrowed above, but many forms have a round head, and in some species it is round in the first stage and then conical. There are also genera (e. g. *Clanis*) in which it is first pointed and later on round. The pupa never has a free tongue-case: the latter never reaches to the end of the wing-cases except in *Compsogena panopus* and perhaps a few allied species. About 150 species are known. As many of them stand rather isolated, we are justified in assuming that a large number of the tropical species have not yet been discovered. It is very noteworthy that in South America only very few species of this subfamily occur, while North America and the Palearctic Region as well as the tropics of Africa and Asia are rich in species. The moths fly at night; only a few forms visit flowers.

10. Genus: **Akbesia** *R. & J.*

Tongue extending to beyond the middle of the abdomen. Palpi short, not porreet. At the upper edge of the eye pendant scales (eye-brow). Antennae of ♂ with long seriate cilia, in the ♀ simply cylindrical without lateral grooves and without prolonged cilia; end-segment of both sexes short. Head with a transverse tuft between the antennae. Tibiae without spines, but fore tibia with long end-thorn; hind tibia with two pairs of spurs, pulvillus small, paronychium present, but the two ventral lobes of the latter only indicated. Apex of forewing pointed, outer margin slightly wavy, and somewhat convex; subcostal and upper radial of hindwing stalked, radial 2 from the middle of the cell. Clasper o" ♂ without friction-scales on the outer side.

One species, which is most closely allied to *Batocnema* from Africa and Madagascar (*coquereli*, *africanus*).

davidi. **A. davidi** *Oberth.* (37 b). A magnificently coloured species. Green, forewing above with light transverse band before the middle and brownish shadowy discal band. Upperside of hindwing with the exception of the margin brownish yellow like a large basal spot on the underside of the forewing. — Akbès in Asia Minor, not rare. The early stages are not yet described.

11. Genus: **Oxyambulyx** *R. & J.*

Tongue extending at least to the middle of the abdomen. Palpi large, porrect in a dorsal view, their apical surface at almost the same level as the frons. Transversely between the antennae a sharp crest formed by the scaling. End-segment of antennae long, smoothly scaled above; antenna of ♀ with the indication of prolonged cilia, without the lateral grooves of the ♂-antenna. Abdomen above densely spinose at the edges of the segments, below with few spines, these standing at the edges of the posterior segments; before the apex in the ♂ on each side a pointed tuft of scales. Tibiae without spines; fore tibia without apical thorn, hind tibia with two pairs of spurs, the outer spur of each pair much shorter than the inner one; at the base of the middle and hind tibiae a white spot. Pulvillus present, paronychium with two lobes on each side. Forewing with pointed apex. The ♀ on the whole darker than the ♂. — Larva with conical head and long horn. Very little is known about the early stages and habits of the moths. Many of the species are very similar, but can always be distinguished by the genitalia and certain constant differences in the markings. The genus is Asiatic-Australian and occurs from Japan to Ceylon and the Andamans, and eastward to Queensland and the Solomon

Islands. Three species occur in the Palearctic Region, but several others extend to the Southern boundary of our Region in North-West India.

schauffelbergeri.

C. schauffelbergeri *Brem. & Grey* (= trilineata *Roths.*) (37 a). Abdomen of ♂ and ♀ without dorsal line, but segment 8 of ♂ with olive median spot. Forewing with two blackish green rounded spots in the basal area, one at the costal margin and the other below the cell, the costal one being the larger; the antemedian double line and the dentate discal lines distinct, the submarginal line posteriorly quite near the margin. The eight abdominal sternite of ♂ is slightly rounded in the middle of the margin, not produced into a process; the harpe ends in an almost straight thin process, which lies along the ventral edge of the clasper, the upper edge of the harpe formed of a dentate ridge which is highest distally and whose apex is downcurved. Vaginal orifice of ♀ large, before it a triangular central lobe. — Japan (Main and South Islands), North China, certainly also distribued further north- and southwards.

ochracea.

C. ochracea *Butl.* (37 a). Clayish yellow; ♂ and ♀ without dorsal line, ♂ with dorsal spot on segment 8. The costal one of the two spots in the basal area of the forewing is much smaller than that below the cell, the antemedian double line of the cell less oblique than in *schauffelbergeri* and the inner discal line farther from the cell. The distal process of the harpe of ♂ much shorter and broader than in *schauffelbergeri* and the upper edge of the harpe bears a large tooth proximally, the apical process of the sheath of duct of ♂ is denticulate in *schauffelbergeri*, non-dentate and pointed in *ochracea*. Before the vaginal orifice of the ♀ a high transverse ridge which is deeply incised in the middle. — Distributed from Japan to North India, not rare.

japonica.

C. japonica *Roths.* (37 b). Distinguished from all other species of this genus by the broad subbasal transverse band on the upper side of the forewing. — Kiu-Shiu and Corea, only a few specimens known.

12. Genus: **Clanis** *Hbn.*

Easily distinguished from *Oxyambulyx* by the spinose tibiae and short end-segment of antennae. The tongue is strongly developed, but at most extends to the base of the abdomen. Forewing entire, with pointed apex. Hind tibia with two pairs of spurs; pulvillus, paronychium and frenulum present. Abdomen above with very numerous spines at the edges and many small weak spines below the scaling on the dorsal surface of the segments. — Larva granulose, with oblique stripes; head in the first stages conical, later on rounded and large; only known of one species.

Seven species; distributed from Japan to Ceylon and the Nicobars and eastward to Timor. The moths easily fade, and freshly caught specimens are much more reddish brown than old ones.

bilineata.

C. bilineata *Walk.* (37 c). Forewing beneath with black longitudinal smear below the cell. Upperside of middle and hind tibiae white. Hind margin of forewing of ♂ as long as the outer margin, in the ♀ longer. Ground-colour reddish brown, shaded with grey; forewing with two ante- and three postmedian transverse lines; at the apex of the cell a pale streak which bounds a large pale costal area; genitalia of both sexes very different from those of all the other species. — Japan and Corea to North India; the most common species of *Clanis* of these districts.

undulosa.

C. undulosa *Moore* (37 b). Usually larger than *bilineata*, darker, the black markings more sharply developed, the wings more elongate, the black basal area of the hindwing larger. Upper side of middle tibiae black, not white as in *bilineata*; spurs of tibiae longer. The anal tergite of ♂ incised in the middle of the apex and the two halves thus formed are downcurved. The eight abdominal tergite of the ♀, which is deeply incised and long in *bilineata*, is very short in *undulosa* and bears but a very shallow sinus. — Distributed from North China to North India.

In North-West India a third species, *deucalion Walk.*, extends to near the Palearctic boundary.

13. Genus: **Leucophlebia** *Westw.*

A genus distinguished by its peculiar colouring. All the species more or less pink; forewing with pale yellow stripe from the base to the apex.

Tongue short and weak. Antennae with short end-segment; in the ♂ the lateral grooves deep and the segments produced above it into short round teeth or even long pectinations; in the ♀ the antenna slightly prismatic, almost entirely without prolonged cilia at the sides. Tibiae spinose; hind tibia with two pairs of spurs, the longer apical one of which is about one-third as long as the first segment of the tarsus; pulvillus and paronychium present, but the lobes of the latter reduced. Forewing entire, with the apex pointed but not produced, outer margin convex, hind angle very strongly rounded, not produced even in the hindwing. — Larva granulose, on each side with two white longitudinal stripes, the upper one of which is broad and the lower indistinct. According to Boisduval on sugar-cane. — Africa and India, distributed northward to North China. So far five species are known.

lineata. **L. lineata** *Westw.* (37 c). The apex of the palpi and the frons blackish; the maize-coloured longitudinal stripe of the forewing narrow. Larva green, head white, horn and legs pink. — From North China (Shantung) to Ceylon and eastward to the Philippines and Celebes.

emittens. **L. emittens** *Walk.* (= bicolor *Butl.*, damascena *Butl.*). Frons and apical surface of palpi not blackish, but of the same red colour as the occiput and the pronotum. The maize-coloured stripe of forewing broader than in *lineata.* — Widely distributed in India, extending into the Palearctic Region in the North-West.

14. Genus: **Polyptychus** *Hbn.*

The species belonging here are so very numerous in Africa and show such considerable differences that later it will probably be necessary to divide up the genus. In the Asiatic (nomenclatorially typical) *Polyptychus* the tongue is yellow, very weak and so short that when unrolled it does not reach to the tip of the fore coxae. The antennae of ♂ and ♀ with lateral grooves and prolonged cilia. Tibiae spinose, hind tibia with two pairs of spurs which do not bear spines; pulvillus and paronychium present. Forewing with strongly dentate outer margin. Inner margin distally deeply incurved, so that the hind angle projects backwards. Abdomen above with very numerous weak spines on the surface below the scales and stronger spines at the edges. — Larva green, with two greenish yellow dorsal longitudinal stripes, whitish oblique lateral stripes and conical head. Pupa glossy, cremaster fairly smooth, with two points.

The two Indian species extend into the Palearctic Region.

P. trilineatus. Varies from blackish brown to yellowish grey, and is shaded with violet grey. Forewing with a straight dark transverse line in the basal fourth, followed by a rather irregular line, on the disc two lines which run about parallel with the outer margin, the inner one straight, the outer one curved outwards below the middle. Hindwing above with faint discal line and at the anal angle a bluish grey spot. Beneath paler than above, both wings with one or two distinct discal lines. Genitalia complicated and unique, varying strongly
trilineatus. geographically. For larva cf. above. Known from Ceylon to China, the Philippines and Celebes. — **trilineatus** *Moore.* The inner discal line of the forewing touches the lower angle of the cell and is therefore much more proximal than in the other subspecies; the outer line correspondingly shifted proximad; between the two lines no dentate line. Beneath the proximal discal line is absent. North-West India, at the boundary of the Pale-
undatus. arctic Region, only one specimens (♀) known. — **undatus** *R. & J.* (= dentatus *Walk.*, nec *Cr.*) (37 c). Proximal discal line of forewing distant from the cell. Both wings beneath with two transverse lines between the cell and the margin. Between the claspers of the ♂ and firmly united with their bases there is a single long process like a fish-tail. The eighth abdominal tergite of ♀ has a large pointed conical hump on each side, and behind the vaginal orifice there is a very large almost straighthly truncate chitinous sclerite. North India and Burma.
chinensis. This form is figured here, because we have only one imperfect specimen of the following race. — **chinensis** *R. & J.* A ♀ from China collected by natives; the wings are cut straight with a pair of scizzors, probably because the margins were torn. Somewhat greyer than *undatus*; upperside of middle and hind tibiae lighter. The eighth abdominal tergite bears a large chitinous sclerite which projects from the scaling and is deeply incised in the middle. The postvaginal sclerite is not truncate as in *undatus*, but broadly and deeply sinuate in the middle.

dentatus. **P. dentatus** *Cr.* (= timesius *Stoll*, modesta *F.*, denticulatus *Hears.*). Ashy grey, the two discal lines of the forewing parallel, the outer one not excurved below the centre, between them a distinct dentate line. The sole-shaped clasper of the ♂ bears a bipartite harpe; the lower process of the latter very long, thin, horizontal, not as in *P. trilineatus* fused with the corresponding process of the other clasper. The eighth abdominal tergite of ♀ at the margin twice sinuate, therefore tripartite. Vaginal sclerite also quite different from that of *P. trilineatus*; the orifice postmedian; beyond it a small triangular sclerite; the vaginal sclerite incrassate before the orifice and the edge of the orifice raised and smooth. — Larva on Cordia; not described; for the pupa cf. above in the generic description. — From Ceylon to Calcutta and Kurachi, and in China. The single specimen from Tse-kou which I saw in coll. Charles Oberthür differs somewhat from Indian specimens.

15. Genus: **Marumba** *Moore.*

Differs from *Polyptychus* particularly by the absence of the proximal pair of spurs on the hind tibia.

Tongue always very weak, the two halves quite separate and reduced to small lobes. Antennae in both sexes with prolonged cilia; end-segment short. Abdomen above without broad scales, densely clothed with thin spines. Tibiae spinose; tarsi stout, the spines of one row of the underside more or less erect in comb-shape.

Distal edge of forewing dentate, apex of hindwing rounded; valve of ♂ separated by a distal incision into a dorsal and a ventral lobe as in *Polyptychus trilineatus*.

The species, although differing in the tone of colour, have nearly the same markings. Forewing with a number of usually thin transverse lines of which the 3 or 4 antemedian ones converge posteriorly; in front of the hind angle a dark double spot at whose proximal and costal sides the distal transverse lines form a deep curve; hindwing almost unicolorous, with a double or a simple spot at the anal angle.

Asia and Europe, eastward to the Moluccas. 15 species.

M. gaschkewitschi. Hindwing above red, likewise the proximal area of the forewing beneath. The granulated caterpillar yellowish green, with 7 thin white oblique lateral stripes, between which there are red spots; horn lang and straight. On Prunus, Pirus, Crataegus. Japan, Amurland and China. The moth in May, June and July. Comes to the light, as do the other species. — **carstanjeni** *Stgr.* (37 d). A small and pale form, *carstanjeni.* which has often a yellowish tint; fringes sharply spotted. Amurland, not rare; Ussuri, Vladivostok, Blagoveshtchensk, etc. — **gaschkewitschi** *Brem. & Grey* (37 d). Forewing more or less shaded with grey; hindwing *gaschkewitschi.* light red, with a grey spot in front of the anal angle; fringes very distinctly spotted with white. North China: Peking, Shantung. — **complacens** *Walk.* A dark form with indistinct fringe spots; underside of the body and *complacens.* hindwing more extended red than in the preceding subspecies. East, Central and West China. — **echephron** *Bdv.* *echephron.* (= roseipennis *Butl.*, heynei *Aust.*, maasseni *Stgr.*) (37 e). Similar to *complacens*, but less extended red beneath and the fringes usually more distinctly spotted. Japan: on the North, Central and South Islands. — The various subspecies are slightly different in the vaginal sclerite of the ♀♀.

M. cristata *Butl.* (42 c). Dark brown. Body with a sharply defined blackish median line; forewing *cristata.* evenly coloured, the lines simple; forewing with a whitish discocellular dot; hindwing with a simple anal spot instead of a double one. — West China and North India.

M. dyras. The commonest species in India: distributed as far as Java and the Philippines. Pale brown; median line of body thin and not prominent; forewing above with paler and darker tints, not so evenly brown as in *cristata*, the external line double, the inner one of this pair being thinner than the outer one; the triangular marginal area bounded by this line darker brown on the underside. The species is somewhat variable and has received numerous names. — On Palearctic territory (North-West India) **dyras** *Walk.* (= si- *dyras.* nensis *Butl.*) (42 e, misprinted dryas) occurs, in which the triangular marginal area of the forewing beneath is darker than in the Malayan *javanica Butl.* Larva green, later on bluish green, covered with white pointed granules; on the sides 6 oblique bands; head conical; horn rough with granules, straight. On Stereulariaceae.

M. maacki *Brem.* (37 e). Easily recognised by the pale yellow colour of the costal and distal margins *maacki.* of the upperside of the hindwing. The double anal spot of the hindwing large. Larva on Tilia cordata, green. Moth in June and July; early specimens in the autumn. — Amurland: Chabarofka, Vladivostok, Ussuri, etc.

M. jankowskii *Oberth.* (37 e). Similar to *maacki*, but the costal and distal margins of the hindwing *jankowskii.* of the same dark colour as the disc. Larva green, more rarely cinnamon, with red lateral oblique stripes which are interrupted at the incisions and at the posterior side of each of which there is a row of pale granules; head almost smooth in front. On Tilia cordata; found rather commonly by Graeser at Vladivostok in August. — Amurland and Manchuria: Askold, Vladivostok, Ussuri, etc.

M. sperchius. Resembling *dyras* in the tint of colour, but on the upperside of the forewing the outer line of the submarginal double line weak and the inner one well expressed, the two lines being inversely developed as compared with *dyras*; moreover, the marginal area of the forewing beneath is not deeper brown than the rest of the wing. Antennae thicker than in *dyras*. Larva green, with oblique lateral lines of pale granules; head granulose. On Castanea. Japan to North India, Liu-Kiu Islands. The moth from June to August. — **sperchius** *Mén.* (= piceipennis *Butl.*, michaelis *Oberth.*) (38 a). Dark clay-colour, sometimes paler. Japan, *sperchius.* Amurland, Manchuria, Liu-Kiu Islands; common in Japan. — **albicans** *Butl.* is a whitish race from North- *albicans.* West India, which extends there probably into the Palearctic Region. — A third subspecies (*gigas Butl.*) occurs in the mountains of Assam.

M. quercus *Schiff.* (38 a). Palpi small also in the ♂. Antennae similar to those of *M. sperchius*, being *quercus.* thick and long. Pale ochreous, the hindwing above more deeply coloured than the forewing. Similar in structure to *sperchius*, which *quercus* undoubtedly represents in Europe, although Tutt placed the two insects into two different genera. In ab. **brunnescens** *Rebel* the forewing is light brown instead of ochreous. Egg oval, green. *brunnescens.* Larva green, with yellowish granules; from segment 3 to 11 seven alternately broader and narrower yellowish oblique lateral stripes; horn bluish; head tapering above, divided into 2 obtuse points, light green, edged with yellow. On shrubs and young trees of oak. Pupa rugate, frontal tubercles distinct; cremaster rough, with two points. The moth from May until August; comes to the light. — Distributed from Lower Austria to Malaga (Rambur) and eastward to Transcaucasia and Mesopotamia. Formerly also recorded from Bavaria, but the specimens found were perhaps escaped from breeding cages.

16. Genus: **Langia** *Moore.*

A large long-winged species. Tongue weak and short, reaching to the apex of the fore coxae. Palpi small, just visible in a dorsal view, almost the same size in ♂ and ♀, with long hairs on the side. End-segment of antennae very short. The head, pro- and mesonotum and the apex of the abdomen smoothly scaled, the body otherwise rough; abdomen without spines, which is very rare in this family. Tibiae likewise without spines, spurs long, with long naked points, hind tibia with two pairs; tarsi short, the spines of one of the rows erect in comb-shape; pulvillus present, paronychium with only one lobe on each side. Distal margin of forewing dentate as in *Marumba;* the cross-vein of the hindwing with a spur projecting into the cell. Frenulum present. Larva covered with pointed white granules, from the pronotum to the horn on each side a subdorsal row of larger granules which are placed on a white line; head a very high cone, frons not granulose; horn very short. On Apricot and Wild Cherry. Pupa short and thick, rounded at both ends, without cremaster; tongue-case longer than sheath of midleg, dorsum rather densely and venter sparsely granulated. The larva produces a hissing sound, whereas the moths chirps when irritated. Elwes found the larva in July and Dudgeon the moth in April.

L. zenzeroides. Grey; forewing with black and whitish lines which run from the hind margin more or less in the direction of the apex. The rough scaling and the mixture of grey, white, brown and black tints recalls *Cossus.* — *zenzeroides Moore* does not occur on Palearctic territory; it is known to us from the whole of North India, from Simla to Assam, and from Yunnan. — *nawai.* **nawai** *R. & J.* (38 b), of which we have 2 ♀♀ from Lake Biwa on Hondo (Japan), is more extended white in the cell and on the disc of the forewing, the discal lines are more interrupted and the anal lines of the hindwing are shorter.

17. Genus: **Clanidopsis** *R. & J.*

In colour similar to *Clanis*; smaller. Tongue very short and weak; tibiae without spines, pulvillus and paronychium absent; hind tibia with 2 pairs of spurs, which are shorter than in *Clanis.* Frenulum present. Abdomen above with very numerous spines at the edges of the segments, the underscales of the tergites partly narrow and spine-like, partly broad. — Larva not described, found on Poplar. — One species.

exusta. **C. exusta** *Butl.* (37 e). Reddish brown, similar to *Clanis* in markings; forewing beneath without black smear below the cell. Mid and hind tibiae grey above. The sole-shaped valve of the ♂ as in *Clanis* without modified scales on the outer surface; on the inner surface the process covered with setiferous granules, and found at the base of the valve in all species of *Clanis,* is absent; penis-sheath weakly chitinised and, as in *Clanis,* without armature. — North-West India, reaching Palearctic territory in Southern Kashmir.

18. Genus: **Parum** *R. & J.*

Forewing entire as in the previous genus, with the apex very obtusely rounded or truncate. The spines of the abdomen numerous, but very weakly chitinised. End-segment of antennae short, the distal segment higher than long; cilia distinctly prolonged also at the sides of the ♀-antenna. Tongue short and weak. Tibiae without spines, spurs very short, hind tibia with one or two pairs, in the latter case the proximal pair concealed in the scaling and sometimes only developed on one tibia; pulvillus and paronychium present, the lobes of the latter short. Frenulum and retinaculum well developed (*porphyria*) or reduced (*colligata*). Subcostal and radial 1 of hindwing separate or on a very short stalk. Valve of ♂ sole-shaped, without patch of modified scales on the outer surface. — Early stages not known. — Two Asiatic species.

colligata. **P. colligata** *Walk.* (= bieti *Oberth.*) (38 b). Greyish green; body without distinct markings. Forewing with a basal band and a subbasal one which are united at the costal margin, both being grey; discocellular dot white; at the apex a dark green halfmoon, from which a dark streak runs into the cell; before the margin an evenly curved light band, which reaches the margin below the apex. Hindwing blackish with green distal margin and a short black anal band. Underside of forewing blackish grey proximally, distally however nearly as above; hindwing brownish grey, a median band and the distal margin green, a discal longitudinal streak black. — Japan (Kiushiu), and distributed from Shantung to Hongkong and West China. This species is particularly interesting on account of the variability of the frenulum and the spurs of the hind tibiae.

19. Genus: **Mimas** *Hbn.*

This purely Palearctic genus belongs into the relationship of *Polyptychus, Cypa* and *Smerinthulus,* to which it is much more nearly allied than to the genera *Smerinthus* and *Amorpha,* with which *tiliae* is usually united in one genus *Smerinthus.*

Antenna of ♂ prismatical, with lateral grooves whose upper edge is somewhat produced laterad, the cilia placed around the groove long; in the ♀ the antenna almost cylindrical, without lateral grooves and without distinctly prolonged cilia; end-segment short in ♂ and ♀. Tongue short and weak. Palpi with rough scaling and hair, much smaller in the ♀ than in the ♂, the joint between segments 1 and 2 covered by the scaling, not being visible from outside as a naked spot. The spines of the abdomen restricted to the edges of the segments, not numerous, feebly chitinised, partly modified to scales, no spines on the surface of the segments. the underscales large. Tibiae with spines; fore tibia without apical thorn, the spur long, almost extending to the apex of the tibia; hind tibia with 2 pairs of spurs; pulvillus and paronychium as well as the frenulum present. Forewing with lobate distal margin, recalling *Cypa*; the discocellulars of the hindwing not or only feebly incurved, and radial 2 (vein 5) in front of the centre of the cell. — Larva anteriorly tapering, finely granulose, the granules enlarged at the oblique side-stripes; head strongly narrowing above, only laterally with some granules. On deciduous trees. Pupa without gloss, densely rugate; tongue-case longer than the cases of antennae and legs, therefore reaching to the wing-cases; cremaster rough with coarse granules. Pupation in the ground near the tree-trunk, sometimes in the crevices of the bark. — One species, which is found from West Europe to Japan.

M. tiliae. Varies from greenish grey to dark brown. Forewing above with a broad dark green or brown median band, the marginal area being shaded with the same colour distally of a pale discal line; hindwing with an ill-defined dark discal band, which terminates with a dark transverse spot at the anal angle. Egg green, deposited singly on the leaves of Lime, Alder, Birch, Elm, Oak and other deciduous trees, on which the larva feeds. The latter green, above yellowish or brownish, with 7 yellow oblique side-stripes anteriorly bounded with red; head smaller than in *S. ocellata* and *A. populi*; horn long, granulose, bluish or green; anal tergite with a large brown or reddish median spot, and two large and several small tubercles; sometimes the side-stripes not well developed, there being occasionally also black lateral spots with pale centre; the red stripes sometimes separated into spots. The tongue-case of the pupa longer than in *Smerinthus* and *Amorpha*. The pupa is now and again found several yards above the ground in the deep crevices of old trees on which the larva has been feeding. The moths from April till July, early specimens sometimes in the autumn; in daytime the moth rests on tree-trunks and fences and bears in this position a remarkably close similarity to a withering or not yet fully developed leaf. — **tiliae** *L.* (38 c) occurs from England, Southern Scandinavia and *tiliae.* Northern Russia to the Mediterranean and eastward to Western Siberia and Transcaucasia; not known from North Africa, Ireland and Scotland. As the moth varies considerably, it has received an enormous number of aberrational names. The name-typical form, according to Linnaeus's description in Fauna Suecica and Mus. Lud. Ulr., has the median band interrupted. According to Tutt (Brit. Lep. III. p. 404, footnote) the type is described as „fasciatis", from which he concludes that Linnaeus's original specimen had a complete band. The description in Syst. Nat. (ed. 10), however, says: „griseo fasciatis", which cannot possibly refer to the dark band. The following aberrations have been based on differences in the development of the band: — ab. **transversa** *Tutt* *), band of forewing not interrupted; ab. **tiliae** *vera* (38 c), band *transversa.* broad, narrowly interrupted; ab. **bipuncta** *Clark*, both parts of the interrupted band more or less reduced; ab. *bipuncta.* **costipuncta** *Clark*, the costal spot large, the posterior spot absent; ab. **centripuncta** *Clark* (= ulmi *Bartel*) *costipuncta.* (38 c), the anterior portion of the band reduced to a small spot which is distant from the costal margin, the inner- *centripuncta.* marginal spot absent; ab. **marginepuncta** *Tutt*, the anterior spot absent, the posterior one present; ab. **obsoleta** *marginepuncta.* *Clark* (= immaculata *Bartel*, exstincta *Stgr.*) (38 c), entirely without band; ab. **pechmanni** *Hartm.*, the dark *obsoleta.* green colour occupies almost the whole forewing, hindwing reddish yellow. According to the tone of colour *pechmanni.* the following additional forms have been distinguished: ab. **brunnea** *Bartel* (= brunnescens *Stgr.*, tilioides *brunnea.* *Holle*) (38 c), ground-colour red-brown, without green; ab. *lutescens Tutt*, ground-colour yellow; ab. *pallida Tutt*, ground-colour grey, without green; ab. *virescens Tutt*, ground-colour entirely green: ab. **suffusa** *Clark*, *suffusa.* forewing grey-green, hindwing almost black. The above described modifications in the band being repeated in the specimens which differ in the ground-colour, Tutt employed double names (ab. *brunnea-costipuncta*, etc.). — **christophi** *Stgr.* (38 d), from Amurland and Japan, differs so little from *tiliae* in structure that I consider *christophi.* its claim to specific rank not to be justified. The tibial spurs are a trifle shorter than in *tiliae*, and the anal segment of the ♂ a very little narrower. The colour is always dark, never green, and the shadowy band of the hindwing stands somewhat nearer the margin. The brown median band varies in a similar way as in *tiliae*. A specimen which corresponds to ab. *centripuncta* of *tiliae* has been named ab. **alni** by Bartel. Larva on Alnus, *alni.* whitish green, so similar to that of *tiliae* that we cannot find any difference between inflated specimens of the two subspecies.

20. Genus: **Callambulyx** *R. & J.*

The species of this genus have been described as *Ambulyx* and *Smerinthus*; but they are a well defined group which differs in many points from the similarly coloured species of *Smerinthus* and from *Compsogene* and *Oxyambulyx* which have a similar wing-shape (and were formerly placed under *Ambulyx*). — End-segment of antennae short, not long filiform as in *Compsogene* and *Oxyambulyx*; lateral grooves of antenna deep in the ♂ and the cilia long, both less developed in the ♀. Tibiae without spines, fore tibia without apical thorn; spur of fore tibia only reaching to the middle; spurs of mid and hind tibiae short, the latter with 2 pairs, the inner apical spur being half as long again as the tibia is broad; pulvillus and paronychium present,

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*) Tutt calls the different specimens belonging here *pallida-transversa*, *brunnea-transversa*, etc.

the latter with 2 lobes. Forewing entire. Valve of ♂ without patch of modified scales on the outer surface. — Early stages, as far as known, similar to those of *S. ocellata*. — Distributed from Japan and Amurland to North India and eastward to Java and Borneo. The delicately green and red moths are among the finest Sphingidae. 4 species, of which 1 is Palearctic, while a second occurs in North-West India near the southern boundary of our Region. Presumably some of the species of the Himalayas will yet be discovered in China.

tatarinovi. **O. tatarinovi** *Brem. & Grey* (38 b). Green, the posterior part of the patagia and the sides of the metanotum pale; abdomen with dark median line, the apex of the cell of the forewing crossed by a pale line which runs along the lower median towards the hind angle; at the apex of the wing an oblique line. Hindwing and basal area of forewing red. Larva on Elm, green, with 7 red-edged white oblique side-stripes; head narrowing above. *eversmanni.* The moth appears in a green form and a brown one; the latter is ab. **eversmanni** *Eversm.* (= brunnea *Stgr.*), which was originally described from Kiachta, but also occurs in Japan. — Japan, Amurland, Transbaicalia, North China; May until July.

21. Genus: **Smerinthus** *Latr.*

For the use of the names *Smerinthus* and *Sphinx* cf. p. 235.

A still further modified branch of the preceding genus, with which *Smerinthus* has the general colouring and scheme of markings in common and from which the species belonging here chiefly differ in the absence of the proximal pair of hindtibial spurs and the retinaculum and in the reduction of the frenulum. The segments of the antenna of the ♂ are distinctly widened above the side-grooves, being even strongly pectinate in one of the American species (*jamaicensis* = *geminatus*). The abdomen has above no broad scales, but only narrow, generally pointed, spiniform scales. Pulvillus and paronychium present. The tibiae are not spinose, but the fore tibia is produced into an apical thorn in some species. Distal margin of forewing dentate. The valve of the ♂ without patch of friction-scales on the upperside; the harpe simple, not divided; the penis-sheath with one or two teeth directed sideways. — Larva very slightly tapering frontad, with conical head, with the exception of the first stage; anal tergite without larger tubercles. Pupa glossy; tongue-case not extending to the wing-cases. — The genus is confined to the northern temperate districts of both Hemispheres, reaching in Africa southward to the Sahara, in Asia to Kandahar (Southern Afghanistan) and the Yang-tse-kiang, and in America to Mexico. The 6 species, some of which consist of several geographical races, have been dispersed during the last 40 years over the genera *Smerinthus Latr.*, *Eusmerinthus Grote*, *Copismerinthus* Grote, *Daddia Tutt*, *Bellia Tutt*, and *Nicholsonia Tutt*. In this classification *Nicholsonia* has been erected for a geographical race of *cerisyi*, which presumably was only possible because Tutt did not attempt to characterise his genera.

Three of the species (*kindermanni*, *ocellata*, and *cerisyi*) are distinguished by the fore tibia ending in a thorn, which is absent from the other three (*planus*, *caecus* and *jamaicensis*.) But as *planus*, apart from this thorn, is very close to *ocellata*, the two species presumably having been originally the western and the eastern subspecies of one species, it would be erroneous in the present case to regard the presence of the thorn as being of generic value.

S. kindermanni. Fore tibia with apical thorn. Antenna of ♂ distinctly dentate. The pulvillus smaller than in *ocellata*. Hindwing without complete ocellus, which is replaced by 2 or 3 black transverse bars which *kindermanni.* are edged with grey or yellowish. From Asia Minor to Eastern Turkestan and Southern Afghanistan. — **kindermanni** *Led.* (38 d) is the most western form, in which the dark markings of the forewing are reddish brown, this subspecies being more brightly coloured than the following ones. Taurus in Cilicia to Transcaucasia, ori- *orbata.* ginally described from Kurdestan. — **orbata** *Gr.-Grsh.* Paler than the preceding, but the markings of the *obsoleta.* forewing still very distinct. Transcaspia, Turkestan and North Afghanistan. — **obsoleta** *Stgr.* Above and beneath paler than the lightest *orbata*, the pale transverse lines of the forewing purer whitish, the dark lines partly rather indistinct or diffuse; the anal spot of the hindwing less sharply defined. East Turkestan, Chitral and Kandahar. Larva on Salix, green with yellow side-stripes; horn blue with green tip.

caecus. **S. caecus** *Mén.* (38 d). Fore tibia without thorn. Antennae as in *kindermanni*. The reddish brown antemedian transverse band of the forewing moderately curved, not sharply angulate as in *kindermanni*, *ocellata* and *planus*. The blue ring in the anal spot of the hindwing incomplete, consisting of two separate spots. Larva not described, „similar to the *ocellata*-larva"; on Salix. Amur district: from Transbaicalia to Askold and North China, not known from Japan; the moth in May and June.

S. ocellata. Fore tibia with thorn. The blue ring in the ocellus of the hindwing complete. Larva on Salix, also frequently on fruit-trees, especially Apple, more rarely on Poplar and other deciduous trees. The young larva light green, with feeble pale oblique stripes and on the thorax a pale subdorsal longitudinal line, head round, horn red. Later the stripes more prominent and the head conical; horn usually blue; the sides of the body often with red spots. Pupa stouter than in *Mimas tiliae*, differing from it in the shorter tongue-case, which does not reach the wing-cases; distinguished from the pupa of *Amorpha populi* particularly by the much stronger gloss; it hibernates (sometimes twice), but single early specimens appear already in the autumn. The moth emerges from the chrysalis early in the morning and flies late at night, usually after midnight; end of April till July, in Central Europe most plentiful in June. — **ocellata** *L.* (= salicis *Hbn.*) *ocellata.* is the European form, distributed from Ireland and Scotland (where it is rare) to the Mediterranean sea and eastward to Transcaucasia, Western Siberia and Asia Minor. The individual variability is not very considerable. In ab. **rosea** *Bartel* the ground-colour of the forewing yellowish brown, and the hindwing more extended and *rosea.* brighter rosy; ab. **pallida** *Tutt* has the ground of the forewing pale grey, the hindwing only being red distally; *pallida.* wheres in ab. **albescens** *Tutt* the ground of both wings is white. The ocellus is normal in these forms, but *albescens.* replaced by a black (triangular) spot in ab. **caeca** *Tutt.* Besides these individual aberrations we have to mention *caeca.* ab. **cinerascens** *Stgr.* which was based by its author on a small ♂ from Naryn (between the rivers Volga and *cinerascens.* Ural) and with some doubt considered a local form or rather a desert-form. As the specimens from the Caucasus and Ural Mts. are normal, the type of *cinerascens* is presumably on abnormal individual. It is pale, the markings of the forewing are less distinct, and the ocellus of the hindwing is for the greater part filled up by the blue ring. — **atlanticus** *Aust.* (38 e) is a large race from North Africa. Early specimens (i. e. those which emerge *atlanticus.* the same year) are somewhat paler than spring specimens; these are ab. **aestivalis** *Aust.* Algeria and Morocco; *aestivalis.* will probably also be found in Tunis.

S. planus *Walk.* (= argus *Mén.*) (38 e). Markings and colouring as in *ocellata*, but the ocellus on the *planus.* whole larger. Fore tibia without end-thorn, which characteristic has been overlooked by all the authors who have written about the relation of *ocellata* to *planus.* Antennae distinctly thicker than in specimens of *ocellata* of the same size. Larva more often on Populus than Salix, pale green with white or yellowish oblique stripes. The moth in July and August. — From Transbaicalia to Japan and southward to the Yang-tse-kiang.

22. Genus: **Amorpha** *Kirby.*

Differs from *Smerinthus* especially in the broad hindwing, which is sinuate between the subcostal and costal veins and produced into a lobe at the subcostal and upper radial. The fore tibia has no apical thorn. The antenna of the ♂ is less distinctly dentate as in the ♂ of *S. ocellata.* Frenulum and retinaculum are entirely (or nearly) atrophied. Hindwing without ocellus; anal angle strongly rounded. Harpe of ♂ bipartite at the apex. — Larva as in *Smerinthus*, but without distinct longitudinal lines on the thorax. Pupa without gloss. — Only in the Palearctic Region.

A. populi. Grey to pale red-brown; hindwing with a large rust-brown patch which covers the base and the greater portion of the hindmarginal area; in the outer half of both wings two parallel lines composed of dark lunules; forewing, moreover, with light discocellular spot and in the proximal half with 2 nearly straight transverse lines, the median area bounded by lines 2 and 3 being anteriorly wider than behind and darkened as a rule. Egg somewhat more globose than in *S. ocellata*, pale green. The young caterpillar with a green horn in contradistinction to *S. ocellata.* The full-fed larva usually yellowish green, sometimes yellow or green; the oblique stripes yellowish, rarely absent; the horn green. On Populus and Salix, more rarely on other deciduous trees (Fraxinus, Betula, etc.). Pupation mostly on the ground; pupa without gloss, somewhat stouter than that of *S. ocellata.* The moth usually emerges at night and flies at dusk. Time of appearance May to July; often a second brood is found, a portion of the caterpillars of which feed still in the autumn when the leaves are already falling, but in spite of the frost frequently are full-fed and pupate. The moths emerge from these latter pupae the next spring. The specimens which emerge in the summer are on the whole more yellowish than the spring examples and their wings are less lobate. The species is found throughout the western portion of the Palearctic Region, with the exception of the higher North, and extends eastward to the Altai. — **austauti** *Stgr.* *austauti.* (= poupillieri *Bellier*) (38 a) is the North-African form, which is especially distinguished from the two other local races by its larger size. The antennae are somewhat more prismatical and the two apical lobes of the harpe (♂) slightly more pointed than in *populi.* Morocco, Algeria and Tunisia. This subspecies varies in a similar way as European *populi.* In ab. **staudingeri** *Aust.* (= flava *Bartel*) the ground-colour is dull yellowish grey, *staudingeri.* and the lines are much feebler than in the normal form; such specimens occur among the summer brood. A second form of the same brood is ab. **mirabilis** *Aust.*, which has the markings well developed, but the wings *mirabilis.* and body (with the exception of the whitish antennae) of a reddish tone. Among the spring-specimens also occur redish grey examples, which are ab. **incarnata** *Aust.* — **populi** *L.* (38 e). As the ground-colour varies from whitish *incarnata.* grey to red-brown and deep slate-grey and the markings are sometimes more sometimes less developed, the *populi.* moth moreover being abundant, the insect has received a host of aberrational names. Gillmer *) divides the specimens into 5 groups according to the ground-colour, separating in each group again several forms according to the development of the markings. If the insect is studied still more minutely and especially if the individual deviations in the wing-contour and in neuration are also taken into account, the number of forms can be increased indefinitely; those recognised by Gillmer differ as follows: ab. **grisea** *Gillm.*, dark grey, often *grisea.* with a feeble rosy tint, without bands on the forewing, rust-patch paler than usual; ab. **grisea-diluta** *Gillm.*, *grisea-diluta.*

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*) Arch. Ver. Freunde Naturg. Mecklenb. 58, p. 70 ff. (1904); Jahrb. Nass. Ver. Naturk. 59, p. 159 (1906).

roseotincta. bands of forewing distinct but diffuse; ab. **roseotincta** *Reuter*, markings and rust-patch well developed, ground-
suffusa. colour with a strong reddish tone; ab. **suffusa** *Tutt.*, ground-colour very dark grey, without reddish tone or
populi. this faint, markings and rust-patch sharply developed; ab. **populi** *L.*, pale grey or ashy grey, median and
cinerea- marginal areas darker, bands and rust-patch strongly marked; ab. **cinerea-diluta** *Gillm.* (= borkhauseni
diluta. *Bartel* partim), as above, but the bands diffuse, indistinct, rust-patch usually duller; ab. **tremulae** *Borkh.*, as
tremulae. *pallida-* above, but without bands, rust-patch duller than usual. ab. **pallida-fasciata** *Gillm.*, whitish grey, pale, median
fasciata. and disto-marginal areas frequently shaded with reddish yellow, markings strong; ab. **pallida** *Tutt* *). as
pallida. *subflava.* before, but markings indistinct, diffuse, rust-patch usually duller; ab. **subflava** *Gillm.*, as before, without
ferruginea- bands, rust-patch duller. ab. **ferruginea-fasciata** *Gillm.*, greyish brown to red-brown, median area darker, rust-
fasciata. patch and bands distinct; ab. **rufescens** *Selys*, as before, bands more diffuse, rust-patch duller; ab. **ferruginea**
rufescens. *ferruginea.* *Gillm.*, without bands. ab. **fuchsi** *Bartel*, reddish yellow to foxy red, median area darker, bands darker; ab.
fuchsi. **rufa-diluta** *Gillm.*, ground-colour as before, bands diffuse; ab. **rufa** *Gillm.*, as before, but without bands. —
rufa-diluta. This classification will only acquire a deeper interest, when the inheritance of each character has been exam-
rufa. ined by careful breeding experiments. We may presume that one or the other form follows the Mendelian
law, or more cautiously expressed (as each of the above forms has a number of characteristics), it is probable
that in species so variable one or the other characteristic is transmitted in accordance with Mendel's law. —
populeti. **populeti** *Bien.* (39 a). A large Western Asiatic race, which is distributed from South-Eastern Russia to the
Altai and the Pamir, and also somewhat differs from *populi* in the genitalia. The yellowish specimens with a
populeto- red tone are *populeti vera*, whereas the grey examples belong to ab. **populetorum** *Stgr.*

rum. **A. amurensis.** Probably originally the Pacific-Palearctic race of *A. populi*. Found from Russia to the
Pacific Ocean and Western China, not yet known from Japan. Smaller than *A. populi*, with narrower wings,
without a light discocellular spot on the forewing and without rust-patch on the hindwing. The harpe of the
♂ broader than in *populi*. The egg is described as yellowish with a grey tint. Treitschke's description of the
caterpillar is erroneous, as already suggested by Boisduval. The larva is so similar to that of *populi* as to be
easily confounded with it. The moths, which are on the wing from May until July according to the locality,
fly often like *populi* above the water, into which they dip like swallows. It is known from certain exotic
Sphingids, especially *Pachylia*, *Hemeroplanes*, *Perigonia*, etc., that they behave in a similar way and often
drink considerable quantities of water. However, the tongue of *Amorpha* is so strongly reduced that it is
hardly likely that the insects can drink. We mention incidentally that in the case of those Exotics only the
amurensis. ♂♂ have the habit of drinking water (which holds likewise good with butterflies). — **amurensis** *Stgr.* (= tre-
mulae *Fisch.-Waldh.*) (39 a). We cannot find any difference between specimens from Russia and Amurland. Bred
specimens are more glossy than those which have been at large. *amurensis* varies in the ground-colour in a
rosacea. similar way as *A. populi*, and we presume that the yellowish and reddish specimens (ab. **rosacea** *Stgr.*) are mostly
early ones which emerged in the autumn of the same years. Finland, North and Central Russia to Vladivostok. —
sinica. **sinica** *R. & J.* Three ♂♂ in coll. Charles Oberthür, one being transferred to the Tring-Museum. Very dark blackish
grey; wings broader than in the previous forms, especially the hindwing, whose distal margin is less produced at
the costal and subcostal, being much more evenly rounded from the subcostal vein to the anal angle; colouring like-
wise more uniform, it being particularly noteworthy that the veins are hardly paler than ground. West China.

23. Genus: **Phyllosphingia** *Swinh.*

Similar in shape to *Amorpha*, but the forewing much more elongate. Second segment of palpi smoothly scaled. Abdomen with long upper- und underscales, and only bearing spines at the edges, the spines moreover being but very feebly chitinised. Tibiae spinose; hind tibia with 2 pairs of spurs; paronychium on each side with one lobe only. Frenulum indicated. — Larva with dispersed granules, the lateral granules larger, with a red ring at their bases; 7 oblique light side-stripes, which are frequently edged with red in front; head strongly tapering above, on each side of the frons a blackish stripe, vertex bifid; horn black above, otherwise red, with large dispersed granules; anal tergite with single pointed granules. Pupa very peculiar; without gloss, most similar to that of *Cressonia juglandis* (North America); tongue-case not reaching the wing-cases; the granules of the wing-cases pointed; abdomen beneath flattened and densely beset with small granules, the granules of the upperside pointed; on abdominal segments 4, 5 and 6 a subapical belt of pointed tubercles, which are very small on the ventral surface; cremaster broad, flat, truncate with the corners produced into a tooth. Foodplant: Juglans mandschurica. The moth in June and July. Larva and pupa, when irritated, produce rather loud whistling sounds, and the pupa, like that of *Kentrochrysalis streckeri*, can crawl rather fast with the help of the pointed tubercles. Occurs from Japan and Amurland southward to North India; Only 1 species.

P. dissimilis. Ground-colour greyish brown or reddish brown, the markings darker. Forewing with a large irregularly triangular median area which extends from the costal margin, where it is broadest, to near the lower median vein, being dark brown or almost black proximally and posteriorly and more or less completely bounded by a pale tint; disto-marginal area likewise dark, produced basad between the two median veins as far as the dark median area, bounded at the apex by a violet-grey lunule. Hindwing with feeble transverse

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*) *salicis seu palustris Holle* is doubtless best placed with? as a synonym of *pallida*, as has been done by Rebel.

bands. Penis-sheath without the numerous spines of *Amorpha*; harpe obtuse, somewhat curved upward, armed with sharp spines at the apex. In front of the vaginal orifice of the ♀ a wrinkled triangular lobe. Two subspecies on Palearctic territory. — **dissimilis** *Brem.* (39 b). Upperside without a pink tone; on the underside *dissimilis.* a submarginal band on the forewing and a central line on the hindwing strongly developed and almost white, very feebly violet. Japan and Amurland. — **sinensis** *subsp. nov.* Somewhat larger than the previous form, *sinensis.* the light portions of the upperside with a pink tone, and the grey markings of the underside reddish violet. Somewhat approaches the North Indian *perundulans Swinh.* Shantung and Central China.

Now follows the second group of Subfamilies (cf. p. 231):

Sphingidae semanophorae.

First segment of palpi on the inner surface with a patch of modified hairs at the base, "basal patch". A few forms whose palpi are strongly reduced have only traces of the basal patch (*Gurelca*, *Odontosida*), while in many other species the patch occupies the whole inner surface of the segment as far as it is not covered with scales. — The tongue is never atrophied, but also never so strongly developed as in many *Acherontiinae*, always reaching at least to the middle of the abdomen. The hind tibia has 2 pairs of spurs, the proximal pair having disappeared only in one of the species known (*Microsphinx pumilum*). The frenulum and retinaculum are never absent.

C. Subfamily: **Sesiinae.**

The anal segment of the ♂ is deeply divided, and frequently the right and left sides are unlike, sometimes the one side being atrophied except for a very small remnant (cf. *Haemorrhagia*). The abdominal sternite 7 of the ♀ is often armed with spines at the apical margin: in the forms with a small and unarmed seventh sternite the mesonotum bears a high crest or the palpi are widened in angle-shape laterally.

The valve of the ♂ sometimes bears modified scales on the outer surface (friction-scales), but these are never large, as is so often the case in the following subfamily, and never lie flat on the valve as in the previous subfamilies. The larva as a rule is cylindrical, and the pupa never has a projecting cariniform tongue-case, the anterior end of the pupa being always round. The great similarity of some genera of this subfamily with *Macroglossum*, which belongs to the following subfamily, is due to convergent development, as is also the agreement in outline and markings of *Pseudosphinx tetrio* with the genus *Protoparce* and of *Nyceryx hyposticta* with *Amplypterus* (= *Ambulyx pt.*). Some species have a lobate distal margin like *Smerinthus.*

The subfamily is almost exclusively American. In the Old World there are only 3 genera which belong here, and these are moreover very specialised. One of these 3 genera (*Haemorrhagia* = *Hemaris pt.*) is purely holarctic, i. e. occurs only in North America and the Palearctic Region, while the two others (*Cephonodes*, *Sataspes*) are tropical. Only one species of these genera, *C. hylas*, which is widely distributed in Asia, also occurs on the African Continent: several species are restricted to Madagascar and neighbouring islands, whereas a number of others inhabit the Indo-Australian countries.

To this subfamily belong the well-kwown species *Pseudosphinx tetrio*, *Pachylia ficus*, *Erinnyis alope* and *ello*, etc., which are the commonest hawk-moths in tropical America; *tetrio* often appears in such numbers that the large bright-ringed larva completely denudes whole trees. — We apply the name *Sesia F.* (1775) to an American genus (*tantalus*, *titan*, etc.). — In the generalised forms the antennae are long and slender, and on the contrary strongly club-shaped in the specialised day-flying genera.

24. Genus: **Haemorrhagia** *Grote.*

As DALMAN based his name *Hemaris* on the same European species for which SCOPOLI, 40 years earlier, had proposed the name *Macroglossum*, which DALMAN suppressed, we place *Hemaris* as a synonym of *Macroglossum* and employ the above generic name for *fuciformis* and allied species.

Antennae very strongly clubbed, thin at the base, abruptly narrowed at the apex into a recurved slender hook, end-segment long and more or less cylindrical, bearing a number of bristles at the tip. The lateral hair-scales of the frons hang down on to the eye. Abdomen with large fan-tail; the spines at the margins of the segments above and below strongly developed, flat, rendering the abdomen very smooth in an anal direction; the spines arranged in several rows, those of the first row rounded and broader than long; abdominal sternite 7 of ♀ (last external one) with the whole apical margin spinose. Fore tibia with a few spines at the apex; mid coxa posteriorly triangularly widened, the tip of the dilated part sharply pointed and somewhat directed away from the body; hind coxa similarly but obtusely widened; the coxae are similarly developed in *Macroglossum.* The pulvillus sometimes absent, in other species reduced, in others again well developed. The anal tergite of the ♂ is deeply divided and slightly asymmetrical; the anal sternite either has 2 long processes or the right process is wanting; right and left claspers and harpes different, the left harpe always vestigial only, while the right one is often produced into a clavate process. Vaginal orifice shifted towards the left side. Forewing entire, with transparent areas or a sharply defined marginal band, tips of subcostals 3 and 4 united; subcostal and radial 1 of hindwing on a short stalk or from a point, cell short, about twice as long as broad, radial 3 and median 1 always separate. — Egg almost globular. Larva cylindrical, feebly tapering anteriorly, with numerous pale dots each bearing a hair; pronotum and horn very distinctly granulose. Pupa black or dorsally brownish; head obtuse with 2 papillae; abdomen long; cremaster flattened, with 2 points, laterally bearing setiferous granules; tongue-case not cariniform. Pupation on the ground. In the warmer districts 2 broods, the second often incomplete, sometimes the pupae hibernate twice. The spring specimens differ frequently so much from the summer ones that they have been considered different species. On the whole the marginal band of the summer specimens is more strongly dentate than in the spring examples, the latter moreover being often smaller than their offspring which emerge in the summer. Moths in daytime in the sunshine, visiting flowers. Of the 15 known species 10 are Palearctic, one is found on the Moluccas and the other 4 are Nearctic. In the Tropics of the New World the genus is represented by the less specialised genus *Sesia* (type: *tantalus*), and in those of the Old World replaced by *Sataspes* and *Cephonodes*, only one species of *Haemorrhagia* occurring in the Tropics (*venata* on the Moluccas).

H. tityus. The marginal band of both wings narrow; cell of forewing without a streak of scales; hind tibia with black apex; abdomen with black belt, behind which the dorsum is yellow. Left clasper of ♂ not spatulate as in *fuciformis*, right harpe with a clavate process. Egg light green. Larva bluish green, with a light subdorsal line at which there is a red spot on each segment; horn brownish red, almost straight. On Scabious, also on Lonicera, Galium, Lychnis, etc. Distributed from Western Europe to Algeria and Tibet, not occurring in the higher latitudes. — *tityus.* **tityus** *L.* (= bombyliformis *Esp.* nec *L.*, musca *Retz.*, fuciformis *Poda* nec *L.*, scabiosae *Zell.*, knautiae *Zell.*) (40 a). Varies but little and has not yet received aberrational names. The black abdominal belt distinct. Found from Ireland to the Kuku-nor, and from Lapland and Scotland to Algeria. — *alaiana.* **alaiana** *R. & J.* (40 a), described from a pair from the Alai Mts., is possibly a distinct species. The black abdominal belt is less distinct in consequence of a yellow admixture, the fan-tail being almost entirely black; forewing with obvious, rather heavy, discocellular bar, and broader marginal band.

H. radians. This species replaces *tityus* in the Pacific district of the Palearctic Region. Thorax, base and hind margin of the hindwing above as well as the base of both wings beneath chrome-yellow. Genitalia almost entirely as in *tityus*. Two individual forms: *mandarina.* f. **mandarina** *Butl.* (= brunneobasalis *Stgr.*) (40 a), marginal band of forewing non-dentate. *radians.* f. **radians** *Walk.* (40 a), marginal band more or less dentate. The two forms occur at the same time, but f. *radians* probably is more frequent in the summer than in the spring, while presumably the reverse is true of f. *mandarina*. — Japan (Main and South Islands, Liu-Kiu), Corea, and from Amurland to the Yang-tse-kiang.

H. fuciformis. Marginal band of forewing broad, measuring at least 2 mm in width behind; cell with a scaled longitudinal line; discocellular bar heavy. Both claspers of the ♂ spatulate, the right harpe with conical process, not a clavate one. Larva with curved horn,; no red spots at the subdorsal line; chiefly on Galium and Lonicera. Distributed from Western Europe to Algeria, Japan and North-West India. — *fuciformis.* **fuciformis** *L.* (= variegata *All.*, bombyliformis *O.* nec *L.*, lonicerae *Zell.*, caprifolii *Zell.*, robusta *Gr.-Grsh.*) (40 b). The anterior abdominal sternites black. The belt of the abdomen usually reddish, more rarely black (*heynei.* ab. **heynei** *Bartel*). The marginal band as a rule non-dentate, but distinctly dentate in *milesiformis.* ab. **milesiformis** *Tr.* (summer specimens?). From Lapland to Algeria, and from Portugal to Central Asia; in Ireland and Scotland very rare and presumably only as an occasional visitor. — *ganssuensis.* **ganssuensis** *Gr.-Grsh.* (40 b). Abdomen beneath not black anteriorly, but everywhere grey. Amdo, Sinin.— *affinis.* **affinis** *Brem.* The marginal band of the wings darker than in *fuciformis*; the discocellular band of the forewing thinner. f. **affinis** *Brem.* (= sieboldi *Orza*, whitelyi *Butl.*) (40 b), marginal band non-dentate; sides of thorax paler than the middle of the back. *confinis.* f. **confinis** *Stgr.* (40 c), marginal band dentate; sides of thorax pale; *alternata.* f. **alternata** *Butl.* (40 c), larger than the two previous forms, the whole upperside of the body deeper yellow, underside of abdomen sparsely grey, the posterior sternites reddish with light median line; marginal band strongly dentate; apparently the predominont form in the summer. *affinis* is found from Northern Japan and Amurland to Central China; the f. *confinis* is only known to me from Amurland.

beresowskii. **H. beresowskii** *Alphér.* (40 b) resembles the following species, of which it is possibly the West-Chinese representative. The marginal band of the hindwing, however, is broader, its diameter being equal to the distance of two vein-tips from one another. Genitalia slightly different. — In West China, in June and July.

H. staudingeri. Base of abdomen black; sides of thorax light; cell of forewing without longitudinal streak; marginal band with short teeth or entire. Base of both wings black on upperside; abdominal border of hindwing with a vitreous streak. Anal tergite of ♂ longer than in *fuciformis*, *tityus* and *beresowskii*; right harpe with a long clavate process. Amurland and China. — *ottonis.* **ottonis** *R. & J.* (= affinis *Stgr.* nec *Brem.*) (40 c). Thorax with pale lateral stripe; hind tibia yellowish grey with black apex. Amurland. — *staudingeri.* **staudingeri** *Leech* (40 d). Side-stripe of thorax less distinct; basal half of abdomen deep black, and therefore strongly contrasting with the posterior segment; hind tibia black with the exception of the base. Chang-Yang, Central China, obtained in July.

saundersi. **H. saundersi** *Walk.* (= curtisi *Bdv.*) (40 c). Resembles *C. hylas* and *picus* in the colouring of the body; it is, however, a *Haemorrhagia*. Abdomen with a brownish red dorsal belt occupying segment 5 and more or less distinctly encroaching on 4; segment 6 frequently with a brownish red median spot; abdomen beneath brownish red, with grey scaling in the centre of the segments. Marginal band on both wings very thin, with the exception of the apex of the forewing. — Kashmir and North-West India, from June to August, eastward to Cochinchina.

croatica. **H. croatica** *Esp.* (= sesia *Hbn.*) (40 e). As the wings have no vitreous patches, many authors even nowadays still place this species near *Macroglossum stellatarum* instead of near *H. fuciformis* and *tityus*.

Genitalia very similar to those of *tityus*. Pulvillus strongly developed. Thorax and forewing olive-green; marginal band of forewing reddish brown; hindwing brownish red, without marginal band. Abdomen with a brown-red belt and a black fan-tail. Larva on Scabious, more rarely on Asperula and Cephalaria, end of June, July and again in the autumn. Ground-colour very variable, ranging from whitish yellow to bluish green and from pale red to dark red; a broad lateral stripe white; horn reddish yellow; dark patches between the prolegs. Pupa red-brown. The moth in May, June and August. Distributed from Croatia through South-East Europe to Asia Minor and Transcaucasia.

H. rubra *Hamps.* (40 e). Red-brown; forewing with vitreous spots, which are rather variable and more or less dusted with red-brown. Hindwing without transparent area. The pulvillus, in contradistinction to *croatica*, is very small. The genitals of the ♂ resembling those of *croatica* and *tityus*, but the process of the right harpe is longer. — Only known from Kashmir. *rubra.*

H. dentata *Stgr.* (42 f). Very rare in collections. Third abdominal segment only yellowish white at the sides. Fan-tail red mixed with black. Forewing olive-green, with a straight transparent band. The vitreous spot of the hindwing small, the base of the wing green. The genitalia are nearest to those of *fuciformis*. — Syria: Aintab (north of Antiochia). *dentata.*

H. ducalis *Stgr.* (= tamiri *Gr.-Grsh.*) (40 d). Differs from *dentata* above all in the yellowish white on the third abdominal segment being complete above, in the absence of the pulvillus and in the structure of the genitalia. — Transcaucasia and North Afghanistan eastwards to the Pamirs and Transalai; probably more widely distributed in Central Asia. *ducalis.*

25. Genus: **Cephonodes** *Hbn.*

An essentially tropical genus, in which the cell of the hindwing is even much shorter than in *Haemorrhagia* and in which the subcostal and first radial are always stalked like the third radial and first median. Pupa blackish red-brown, rounded at the anterior end, with feeble frontal tubercles, cremaster long-conical and almost smooth.

As in the species of *Haemorrhagia* with vitreous wings these are covered with scaling also in *Cephonodes* when the moth emerges from the chrysalis.

C. hylas *L.* (40 d). Fore tibia without apical thorn. Underside of thorax white or slightly yellowish. Upperside of the body green, abdomen with red belt. — Distributed from West Africa to Queensland, and from India to Japan; very plentiful. Larva exceedingly variable. As the species will be dealt with more fully in Vol. X, we mention in this place only that the Indo-Palearctic form is *C. hylas hylas* L. Flies in daytime. *hylas.*

26. Genus: **Sataspes** *Moore.*

An imitation of *Xylocopa*, a genus of Bumblebees. Antennae in ♂ not club-shaped, in ♀ distally feebly swollen. Cell of hindwing more than twice as long as broad. Wings scaled. Otherwise similar to *Haemorrhagia*. Genitalia of ♂ very peculiar on account of the atrophy of the anal sternite, the reduction of the valves and the strong development of the harpes. Early stages not known. — Indo-Malayan, one species occuring northward to China.

S. infernalis *Westw.* (40 e). Thorax yellow above. In the ♂ the posterior abdominal segments beneath likewise yellow. Abdomen above with or without yellow belt. — From Shanghai, Central and West China southward to Burma and North India; in China in June and Juli, in the south already from March. Flies by day. *infernalis.*

D. Subfamily: **Philampelinae.**

The anal segment of the ♂ not divided longitudinally, always symmetrical. The abdominal sternite 7 of the ♀ membranous at the apex, never bearing spines. Mesonotum never with a high crest, and the palpi never widened laterally in angle-shape.

The species of this subfamily often exhibit a striking resemblance to forms of other subfamilies. *Dahira* recalls *Oxyambulyx*; *Deidamia*, *Temnora*, etc., *Smerinthus*; *Macroglossum* resembles *Sesia*, *Haemorrhagia* and *Perigonia*; and *Deilephila*, *Chromis* and *Ampelophaga* recall *Chaerocampinae*; etc.

The generalised genera of the Old World from which most of the genera of the Eastern Hemisphere can be derived without difficulty are *Nephele*, which is represented in abundance in tropical Africa, and *Deilephila*, which is predominantly Oriental. The former branch terminates with *Macroglossum* and *Rhopalopsyche* and comprises many species which resemble the *Sesiinae*, and the second branch, which is smaller, ends with *Berutana* and *Darapsa*, and contains forms which incline towards the *Chaerocampinae*.

27. Genus: **Deilephila** *Lasp.*

Eyes large, without pendant eye-lashes. Palpi large and obtuse, smoothly scaled. Antennae slightly clubbed in ♀, setiform in ♂, terminal segment long and thin. Tibiae without spines, mid tarsus with basal comb. Inner and outer spurs of tibiae very different in length, the long apical spur of the hind tibia longer than tarsal segment 2. Wings entire, apex of forewing pointed, radial 2 of hindwing before the middle of the cell. Abdomen above green at the base. Valve of ♂ with (less than 10) large, erect, modified scales on the outer surface. — Larva anteriorly tapering, with a pale lateral stripe from the head to the horn; thorax with an ocellus on each side; horn long in the first stages and straight or its tip curved upward, later simply curved downward and short. Pupa brownish clay-colour, with a row of black spots along each side; cremaster ending in two points.

Of the 7 known species 1 extends into the Palearctic Region. The species resemble each other in pattern.

nerii. **D. nerii** *L.* (39 c). An African species which is very abundant in tropical Africa, is found eastwards as far as North-East India, and every year in June and July wanders far northward in Europe. Light green, shaded with dark green. Forewing with a pale-bordered basal dot, a light area before the middle narrowing behind, running along the hind margin to the base and being usually (but not always) of a reddish tint, distally of this area a dark green band which is anteriorly widened somewhat in hatchet-shape and on the distal side bounded by a light line extending from the costal margin to radial 3. Hindwing only green at the distal margin. — Egg as large as that of *Sphinx ligustri.* Young larva green; full-fed with yellow thoracical segments, more rarely altogether yellowish or brownish, from segment 4 on each side a light stripe which ends at the horn. Ocellus large, transversely constricted. On Nerium, also Vinca. The moth in Southern Europe in May and June and again in August, sometimes a third generation in the autumn; in the tropics all the year round. The specimens of the spring-brood of Southern Europe have a slightly different tint than the summer specimens.

The other species belong exclusively to the Indo-Australian fauna.

28. Genus: **Ampelophaga** *Brem. & Grey.*

Antennae filiform, slender, distally very gradually tapering, with a very short end-segment. Eyes without pendant lashes. The spines of the abdomen very numerous and but weakly chitinised. Wings entire, apex of forewing pointed, costal margin of hindwing not widened. Spurs of tibiae very unequal in length, the longer ones more than half the length of the first tarsal segment, which is but little shorter than the tibia. Abdomen with sharply defined pale dorsal line. — Larva strongly tapering in front, with small head. — Pacific Palearctic and Indo-Malayan. Closely allied genera occur in North America.

A. rubiginosa. Reddish brown, more or less shaded with grey. Forewing with darker transverse bands and lines, an oblique apical line continued in zigzag shape to the hind margin. Larva on Vitis, Ampelopsis, and Convolvulus, with a pale stripe which runs from the horn frontad, lateral oblique bands being connected *rubiginosa.* with it. Japan to North India. — **rubiginosa** *Brem. & Grey* (= romanovi *Stgr.*, ienobu *Holl.*). (39 d). The dark bands of the forewing well developed. The apex of the antenna with greyish yellow scaling. Distal margin of hindwing rusty red. Some of the bred specimens are very pale. Japan and Amurland to Hongkong *fasciosa.* and West China, throughout the summer, presumably in several broods. — **fasciosa** *Moore* (39 d). The apex of the antenna dorsally on the frontal side with black scaling. Upperside of body and wings duller greyish brown, bands of forewing more or less obsolete, fringes of hindwing almost white. From Southern Kashmir to Assam.

khasiana. **A. khasiana** *Roths.* Median line of body duller than in *rubiginosa*, the body laterally and beneath much deeper red than in the preceding species, upperside likewise deeper in colour, the spaces between the bands of the forewing prominently whitish grey, the dentate discal line of *rubiginosa* replaced by a non-dentate band. — North India; in the British Museum also a ♀ from Mupin (West China) which is somewhat paler beneath.

29. Genus: **Berutana** *R. & J.* *)

A reduced derivation from *Ampelophaga.* Head with distinct tuft between the antennae. At the upper edge of the eye pendant scales (eye-lashes). Pulvillus small (of normal size in *Ampelophaga*), paronychium with only one lobe on each side. The long apical spur of the mid and hind tibiae less than half the length of the first tarsal segment. Distal margin of wings slightly dentate; subcostal and radial 1 of hindwing on a short stalk. — Larva anteriorly strongly tapering, on each side with a longitudinal line and oblique stripes; on Vitis. Pupa with blackish spots. — Only 1 species.

B. kotschyi. Pale reddish brown shaded with grey; forewing with darker transverse lines and a discal *syriaca.* band, which are all but moderately obvious. Syria to Persia. — **syriaca** *Led.* (39 e). The markings of the forewing distinct. Ground-colour sometimes paler, sometimes deeper. The ♂ paler than the ♀. Syria and Pale- *kotschyi.* stine, not rare in the neighbourhood of Beyrut at the end of July and in August. — **kotschyi** *Koll.* (= mardina *Stgr.*). Larger than the previous form. Mesopotamia and Southern Persia (Shiraz).

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*) In *Tutt, Brit. Lep.* vol. IV. p. 57 (1904), the following foot-note occurs: „Genus — *Clarina*, type *syriaca. Florina*, type *japonica. Lilina*, type *bisecta* (*silhetensis*). *Acteus* might well stand as the type of *Pergesa*, and *oldenlandiae* of *Xylophanes*". Such names without description as *Clarina, Florina* and *Lilina* are a most superfluous ballast and should always be rejected.

30. Genus: **Acosmeryx** *Bdv.*

Antennae slender, setiform, gradually pointed, with a very long, thin end-segment clothed with rough scaling. Palpi large, rounded. Eye without lashes. Inner spurs of tibiae double the length of the outer ones. Mid tarsus with a basal comb composed of very long bristles. Apex of forewing always sinuate. Valve of ♂ with several rows of large scales on the outer surface. — Larva tapering anteriorly, with small head and pointed horn curved downward; from head to horn a pale lateral line, which is less distinct on the anterior segments. Pupa with 2 frontal tubercles, the tongue-case somewhat enlarged. — Distributed from India to Australia, and northward through China to Japan. 7 species.

A. naga *Moore* (= metanaga *Butl.*) (39 e). Easily recognised by the large grey subapical area of the forewing being posteriorly sharply bounded by a band which runs from the costa to the centre of the distal margin. — Distributed from the northern island of Japan to North India, but not yet known from Amurland and China. As the Japanese specimens do not differ from Indian ones, we may conclude that the species occurs also in the interjacent countries. The moth has been found in Japan in July. *naga.*

A. castanea *R. & J.* (39 e). Chestnut-brown; the underside of the abdomen rust colour. Markings less distinct than in *naga*; discal band of forewing widened on the outer side before the middle, its proximal edge rather strongly curved. Hindwing less grey than in the nearest allied species. On the underside the disc of both wings reddish brown. — Known from Japan and Central China; June, August. *castanea.*

31. Genus: **Rethera** *R. & J.**)

Eyes with moderate lashes. Antennae clubshaped, abruptly tapering to form a short hook, end-segment short, not long and filiform. Spur of fore tibia extending beyond the tip of the tibia; the long apical spur of the hind tibia less than half as long as the first tarsal segments, which is about as long as the tibia. Pulvillus and paronychium absent. Wings entire; subcostal and radial 1 of hindwing on a stalk. Friction-scales of valve of ♂ truncate and rather small. — Early stages not known. — 1 species.

R. komarovi *Christ.* (= stipularis *Swinh.*) (39 b). Differs from all the Palearctic Sphingidae in the light transverse band of the green forewing, and in the hindwing being yellow with a black submarginal line. Under surface a beautiful pale rosy red. — Known from Asia Minor to Afghanistan and Transcaspia; May to July; rare. *komarovi.*

32. Genus: **Gurelca** *Kirby.*

Head with two tufts which are united behind. Antennae short, filiform, not clubbed, strongly prismatical in ♂, cylindrical in ♀; end-segment short. Palpi porrect, terminal surface triangular; the basal spot not developed; the scales at the apex of segment 1 erect in fan-shape. Eyes covered above by long pendant lashes. The spines of the abdomen long, weakly chitinised; fan-tail triangular in ♂, truncate in ♀. All the tibiae spinose; spurs of mid tibia of nearly equal length. Distal margin of forewing irregularly dentate; costal margin of hindwing incurved, the costal vein in consequence curved down to near the subcostal. Valve of ♂ without enlarged scales. — Larva anteriorly tapering, with a longitudinal line and oblique stripes. Tongue-case of pupa cariniform. — 2 species, which both enter our territory in the Pacific districts. The moths occur from the spring to the autumn.

G. hyas *Walk.* (= geometricum *Moore*, macroglossoides *Walk.*) (40 g). The distal marginal band of the hindwing is of even width throughout. Harpe of ♂ spatulate, curved upwards; apical process of penis directed obliquely distad. — Indo-Malayan, reaches in North-West India the Palearctic boundary and is also known from Southern China and Formosa, presumably occurring at least as far as the Yang-tse-kiang valley. *hyas.*

G. masuriensis. The distal marginal band of the hindwing is strongly narrowed backwards. Harpe of ♂ with a basal process, but without apical one; apical process of penis long, curved frontad and lying flat on the penis. From North-West India to Japan. — **masuriensis** *Butl.* (= himachala *Butl.*, erebina *Butl.*). Distal marginal band of hindwing broad. Forewing dark. From Southern Kashmir to Burma. — **sangaica** *Butl.* (40 g). Forewing paler, distal marginal band of hindwing more strongly narrowed posteriorly. Japan, Corea, China and Formosa. *masuriensis. sangaica.*

33. Genus: **Sphingonaepiopsis** *Wallengr.* **)

Very closely related to *Gurelca*. Palpi rough, segment 1 with apical fan as in *Gurelca*. Antennae dentate or pectinate in ♂, simple and club-shaped in ♀; end-segment short. Eye-lashes present. Head with high tuft. Tibiae spinose; mid tarsus with basal comb. Distal margin of forewing dentate or lobate; radial 3 and median 1 originating close together, as in *Gurelca*. Costal margin of hindwing almost straight; lower angle

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*) Synonym: *Borshomia* *Aust.* (1905).

**) Synonym: *Pterodonta* *Aust.* (1905).

of cell less pointed than in *Gurelca*, in some species the 2 median branches thrown off close together. — Larva anteriorly hardly at all tapering. — So far 2 Palearctic, 1 Indo-Malayan and 3 Ethiopian species are known, which are all very small.

gorgon. **S. gorgon** *Esp.* (= gorgoniades *Hbn.*) (40 g). Body and wings grey; abdomen with 3 white dots on each side; hindwing brownish. Antenna of ♂ with short teeth. Larva white or greenish, with 6 pale longitudinal stripes partly edged with red. On Galium. The moths from May until July and again the end of July and in August. — Southern Russia to the Altai and southward to the Cilician Taurus.

kuldjaensis. **S. kuldjaensis** *Graes.* (40 g). Larger; hindwing orange-yellow with darker distal margin. Harpe of ♂ obviously different from that of *gorgon*. — Kuldja, Tian-shan and neighbouring districts.

34. Genus: **Sphecodina** *Blanch.*

Antennae setiform in both sexes, not club-shaped, end-segment short. Eye-lashes strongly developed. Abdomen broad, flattened, with lateral tufts of scales, at the apex in ♂ a tripartite fan, in ♀ a simple conical tuft; the spines of the abdomen above and beneath strong, even the basal sternite bearing some weak spines. Mid tarsus without basal comb. — Larva cylindrical, when young with horn, which is replaced later on by a polished button. Pupa strongly rounded anteriorly, the tongue-case not cariniform. — 2 species, one occurring in the Atlantic district of North America, the other in the Pacific district of the Palearctic Region.

caudata. **S. caudata** *Brem. & Grey* (39 e). Forewing without teeth, the margin moderately incurved in front and behind. Body and forewing dark brown with black markings, hindwing yellow with blackish distal marginal band, which is widest at the anal angle. — Larva blackish, on each side two rows of large pale reddish brown patches, markings on the upperside of the thorax and the upper surface of the last two segments of the same colour. On Vitis. — Amurland and North and East China. During the last years bread in some numbers in Shantung by the missionary L. Klapheck.

35. Genus: **Proserpinus** *Hbn.*

Antennae club-shaped in ♂ and ♀, abruptly narrowed to an apical hook, end-segment at least three times as long as broad. Eyes with strong lashes. The spines of the abdomen feebly chitinised; the anal tuft truncate, at the sides of the abdomen short tufts of scales. Tibiae spinose, fore tibia with apical thorn and a lateral row of long spines. Mid tarsus without basal comb. Inner and outer tibial spurs different in length. — Larva with a pale subdorsal stripe and lateral oblique bands, the latter directed from above anteriorly to below posteriorly, not as in *Sphinx ligustri* from below anteriorly to above posteriorly. The same direction of the oblique bands is met with in *Pholus*. Head minutely hairy, small; horn short or in the later stages replaced by a polished button. Pupa slender and glossy, with 2 frontal tubercles; tongue-case not cariniform; mesonotum with an interrupted transverse carina; cremaster long and thin, terminating in two points. The larva wanders about long distances before pupating. In breeding the species the larva must be kept in a cool place when in this stage, the propensity of wandering being thereby abated, and the pupa has to be kept dry. — One European and 4 North American species.

P. proserpina. Pale green; forewing with irregular distal margin and a dark green median band, which encloses a light-edged dark green discocellular bar. Hindwing yellow with black distal marginal band. The small egg green. The young larva dull green with pale longitudinal lines; later on usually brown with black markings; the horn replaced by a black-centred brownish yellow disc; June to August, on Epilobium, Lythrum, and Oenothera, when young rests on the upperside of the leaves and later keeps well concealed. Found from Central Germany to Buchara and southward to Portugal and the Mediterranean; not yet known from North
proserpina. Africa. — **proserpina** *Pallas* (= oenotherae *Schiff.*, schiffermilleri *Fuessl.*, oenotheroides *Butl.*) (40 g). The
attenuata. European form, which is known as occurring as far east as the Caucasus. In ab. **attenuata** *Schultz* the median
grisea. band of the forewing is only half as broad as in normal specimens; in ab. **grisea** *Rebel* the forewing is grey in-
brunnea. stead of green; and in ab. **brunnea** *Geest* it is pale leather-colour with a reddish ochreous median band. — **ja-**
japetus. **petus** *Gr.-Grsh.* Larger, slightly paler, the distal marginal band of the hindwing beneath narrower. Buchara; Ferghana. Probably not constantly different; I have only seen one ♀.

36. Genus: **Macroglossum** *Scop.*

Tongue longer than in the previous genera. Eye with distinct pendant lashes. Palpi broad, the pointed tip porrect, terminal surface triangular. Head broad, without distinct tuft. Antennae club-shaped in ♂ and ♀, abruptly tapering to a short hook, end-segment slender, long and almost filiform in some species, shorter in others. Thorax and abdomen broad, flattened, the abdomen in ♂ and ♀ with lateral tufts and moveable fantail; the spines of the abdomen as in *Haemorrhagia* very strongly chitinised, placed in several rows, those of the first row rounded and broader than long, with the exception of the proximal segment; sternite 7 is not as in *Haemorrhagia* (false *Hemaris*) a truncate plate with spines at the edge, but is triangular with the apex membranous and non-spinose. Mid coxa as in *Haemorrhagia* posteriorly produced into a sharp tooth which partly covers the hind leg. Mid and hind tibiae above with long hair-scales, therefore appearing broad; spurs of tibiae different in length, the shorter spur of the mid tibia with a comb of stiff bristles or spines; mid tarsus with basal comb; pulvillus present, paronychium with 2 lobes on each side; the first hindtarsal segment laterally compressed so as to fit close to the body, its outer surface bearing many spines all directed backwards. The spines of the abdomen and tarsi, as well as the tooth of the mid coxa render the body smooth and slippery. Distal margins of wings never dentate or lobate, apex of forewing always pointed, but never falcate, subcostals 3 and 4 not joined distally as is the case in *Haemorrhagia*; subcostal and radial 1 of hindwing originating separately, radial 3 and median 1 likewise never stalked. — Larva anteriorly tapering, longitudinally striped, with small head; horn granulose, long in the early stages, later on shorter. Pupa anteriorly compressed, tongue-case cariniform; cremaster very diversely developed, being thin and conical in some species, broad and flattened with dentate margins in others, etc. — The genus contains nearly 70 species, which are all confined to the Eastern Hemisphere. One species is found on the African continent south of the Sahara, 5 occur on Madagascar and neighbouring islands, one in Europe, all the others in Asia resp. the Indo-Australian Region. The moths fly in daytime and have several broods in the warmer districts. Many are so similar to one another in colour and markings that they can only be distinguished on very close examination. When describing new species it is absolutely necessary to give the structure of the genitalia, as even good coloured figures are not always sufficient for the recognition of the species.

M. stellatarum *L.* (40 f). Body and forewing grey; hindwing rusty yellow with darker base and red-brown distal margin. The tone of the colour and the markings vary in all districts, and we have not found any fairly constant distinctions between the specimens from such widely separated countries as Western Europe, Japan and North-West India. Egg greenish white, smooth, longer than thick. Larva on Rubiaceae, green or reddish, with minute white granules, a subdorsal and a subventral stripe; spiracles dark; horn bluish. Cremaster of pupa slender, conical. The moth hibernates. Everywhere in Europe and Northern and Central Asia (with the exception of the higher North), southward to the Sahara and Anterior India; presumably wanders like so many widely distributed species of *Sphingidae* which are not split up into geographical races. ab. **fasciata** *Rebel* has a broad black transverse median band on the forewing. In ab. **subnubila** *Schultz* the hindwing, and sometimes also the abdomen, is blackish brown. *stellatarum. fasciata. subnubila.*

M. bombylans *Bdv.* (= walkeri *Butl.*) (40 f). Blackish olive shaded with grey. The lateral tuft of abdominal segment 3, the base of 6 and the underside of the thorax white. Abdominal margin of the hindwing and some lateral spots on the abdomen yellow. — Known from Japan to North India, abundant; not yet recorded from Amurland. *bombylans.*

M. pyrrhosticta *Butl.* (= catapyrrha *Butl.*) (40 f). Upperside of body and forewing grey-brown, abdomen with yellow lateral spots. Forewing with a transverse band before the middle, somewhat widened behind, a discal double line which is excurved anteriorly and incurved below the middle, and a submarginal spot below the apex; these markings black-brown. Hindwing yellow, the base and a broad distal marginal band black-brown. Underside of both wing rusty red. Larva greenish white, anterior segment green; a dorsal median and on each side a subdorsal white line edged with green. — Distributed from Japan to North-India and Lombok; very abundant. *pyrrhosticta.*

M. troglodytus *Bdv.* Smaller than *pyrrhosticta*, the forewing more strongly marked with slaty grey, otherwise almost exactly like *pyrrhosticta* in colour and markings. Harpe of ♂ bifid in both species, the upper lobe obtuse and dentate in *troglodytus*, acuminate and at its upper margin non-dentate in *pyrrhosticta*; the apical process of the penis-sheath obtuse in the former and pointed in the latter. — Indo Malayan, northward distributed to China; likewise common. *troglodytus.*

M. fringilla *Bdv.* (40 e). A sharply marked median stripe on head and thorax and a triangular patch on the patagia blackish; underside of body dark rusty brown, the palpi, middle of breast and a median spot on the proximal abdominal segment almost pure white. Forewing above with a well-marked blackish submedian band which is widened at the hind margin in the direction of the base, the second discal line heavy, distally widened to form a spot below radial 1. Proximal edge of the distal marginal band of the hindwing convex. — Occurs from China to South India and eastward to the Moluccas. *fringilla.*

M. saga *Butl.* (= kiushiuensis *Roths.*) (40 f). About as large as *stellatarum*. Colouring similar to that of *pyrrhosticta*. Head and thorax with dark median line; abdomen on each side with 2 distinct yellow spots, on underside without median spots. The grey median band of the forewing and the grey costal spot contrast sharply with the dark portions of the wing, and this subapical spot is extended to the apex on account of the brown-red subapical costal spot being shaded with grey. The yellow discal band of the hindwing is rather too broad in our figure, being in the specimens hardly so broad at radial 2 as the marginal band. Harpe of ♂ short, obtusely conical, not divided. — Japan, China and North India. *saga.*

There occur presumably more species of *Macroglossum* in the Palearctic districts of China than are known to us from there.

37. Genus: **Rhopalopsyche** *Butl.*

The only genus of *Sphingidae* in which the antennae of both sexes are without cilia. Apart from this characteristic the genus agrees with *Macroglossum*, but the antennae are yet more strongly club-shaped than in any species of that genus, being also thinner towards the base and here scaled allround. — India and China, southward to Ceylon.

nycteris. **R. nycteris** *Koll.* (= volucris *Walk.*) (40 f). The lateral spots of the abdomen and the median band of the hindwing pale yellow. Markings nearly as *M. pyrrhosticta*, but the ground of the forewing more grey in tint. — Burma to Kashmir and West China; the moths from the spring until the autumn.

E. Subfamily: **Chaerocampinae** *).

The small setiferous process situated at each side of the rostrum concealed by the palpi and probably homologous to the mandibles, is divided only in this subfamily into an apical and a basal portion, the former bearing short or no hairs and the latter long bristles. The inner surface of segment 2 of the palpus is naked for the greater part. The end-segment of the antenna is likewise charakteristic; it is always elongate, almost without scales and bears in every species several (6 or more) bristles at the tip and sometimes some additional ones on the side. The antennae are never dentate. The tibiae are never spinose, and the hind tibia has always two pairs of spurs. The paronychium has always 4 lobes, the pulvillus on the contrary being sometimes reduced to a small triangular lobe. The abdomen is always pointed-conical and bears a simple anal brush, in front of which the ♂♂ have a short tuft on each side.

Nearly 160 species are known, of which 11 occur in Europe, 23 being recorded from the whole Palearctic Region.

38. Genus: **Celerio** *Oken.*

This name is older than *Choerocampa Dup.*, *Phryxus Hbn.* and *Thaumas Hbn.*

The antennae distally incrassate in both sexes, especially strongly clavate in the ♀. Palpi smoothly scaled, without erect hairs, concealing the base of the tongue; the scaling at the apex of segment 1 on the inner surface not arranged as a regular border, but more or less rough, segment 2 without apical tuft. Abdomen conically pointed, the dorsal spines strong, usually arranged in 3 rows. Anterior tarsus always with some enlarged spines on the outer side; the inner apical spur of the hind tibia more than twice as long as the outer one, being about half the length of the tibia; mid and hind tarsi with a feebly developed basal comb. Forewing entire, with pointed apex; subcostal and radial 1 of hindwing separate or from a point or very shortly stalked, radial 3 nearer to radial 2 than to median 1. Genitalia almost the same in the various species, at any rate the differences though constant are so minute that crossing between specimens of different species is not rendered difficult by them. The modified scales on the outer surface of the valve of the ♂ are numerous and usually small; the harpe with a simple process tapering distally. Vaginal sclerite of ♀ obtusely triangular, without special characteristics, orifice large, placed in the median line. — Larva cylindrical, only slightly tapering anteriorly, with subdorsal line and a row of ocelli, which latter are sometimes partly vestigial only. Tongue-case of pupa not enlarged in keel-shape; abdomen without sharply pointed granules; cremaster terminating in 2 points. — The genus is distributed over the whole globe as far as it is suitable for *Sphingidae*. 14 species are known.

The simplification of the genitalia is presumably one of the reasons why hybridisation occurs so frequently. The species can be divided into two groups according to the development of the pulvillus placed in between the tarsal claws:

1. Pulvillus only vestigial as a small triangular lobe: *euphorbiae*, *centralasiae*, *zygophylli*, *vespertilio*, *hippophaës*;
2. Pulvillus developed: *gallii*, *nicaea*, *lineata*.

C. euphorbiae. Abdomen at each side with 2, sometimes 3 black spot (on segments 2 and 3, resp. 2, 3 and 4); scaling of antenna white. Forewing greyish yellow, the markings brownish olive, consisting of a large basal spot reaching to the costal margin and being posteriorly sharply defined, a large spot at the middle of the costa and a small one at 3/4, further a band widening hindward and running from the apex to the hind margin. Hindwing rosy red, the basal area and a submarginal band black, a spot at the abdominal margin white. Variable. Egg pale green, small. Larva very variable; black before the first ecdysis, then green, later on the ground-colour varying from yellow to black; in the black specimens there are, in contradistinction to the larva of *gallii*, usually numerous pale dots dispersed over the whole body; dorsal line red or grey; on each side a complete row of ocelli, below which there is generally a row of smaller ocelli. On Euphorbia. Pupa brownish yellow. One brood, in warm years and in the South two, of which the second is incomplete in Central Europe. The moths according to the district from the spring till July and often again late in the summer or in the autumn; comes to the light. Occurs from France to the Canaries and eastward across North
tithymali. Africa and Europe to North-West India and North China, in numerous geographical races. — **tithymali** *Bdv.*

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*) cf. foot-note p. 231.

(41 b). Wings above dusted with brown, costal margin of forewing broadly brown. Patagia with white upper
edge. Body and wings beneath darker (brownish) than in the following forms, abdominal segments edged
with white beneath. Larva with only one row of eye-spots. Madeira and Teneriffe. — **dahli** *Geyer* (41 a). Abdomen *dahli.*
with 3 instead of 2 black spots on each side. Larva densely dotted with grey, with 2 rows of rather small ocelli.
Corsica and Sardinia. Darkened specimens are ab. **praenubila** *Schultz*; in ab. **lutescens** *Oberth.* the discal *praenubila.*
band of the hindwing is yellow instead of red. — **mauretanica** *Stgr.* (41 b) is usually paler than European specimens *lutescens.*
and never very much shaded with red; the patagia have usually a white upper border, which however is *mauretanica.*
frequently absent, especially in the ♀; the costal margin of the forewing is dark, and the veins traversing the
dark oblique band are at least partly pale. Larva with one row of ocelli. North and Central Algeria;
on Tithymalus. The markings vary in a similar way in European specimens. In ab. **maura** *Oberth.* the *maura.*
median area of the hindwing is dusted with black. — In the South of Algeria, in the desert, occurs the smaller
and paler **deserticola** *Bartel* (42 c), in which the brown discal band of the forewing is traversed by more *deserticola.*
or less extended pale vein-stripes. The upper margin of the patagia always white. In ab. **flaveola** *Oberth.* *flaveola.*
the median band of the hindwing is pale yellow. Larva green, with one row of ocelli; on Euphorbia. — **euphorbiae** *euphorbiae.*
L. (= esulae *Hufn.*) (41 a). Upper margin of patagia and dorsal edges of abdominal segments as a rule
not white. Costal margin of forewing above only brown in exceptional cases; the median patch separated
from the costal border. Larva with 2 rows of ocelli, between which the ground bears light dots. Throughout
Europe, from the Mediterranean to the South of England and Southern Sweden, and from Portugal to the Caucasus;
however, in England *euphorbiae* has been found only a few times and can hardly be regarded as a species
of the British fauna. Both the moths and caterpillars are very variable, and frequently the majority of the
examples from a certain district is of a rather uniform type. The species is evidently on the way in Europe
to split up into a number of geographical races. The following forms have received names: ab. **suffusa** *suffusa.*
Tutt, the greyish yellow portions of the forewing dusted with blackish; ab. **cuspidata** *Rebel*, forewing normal, *cuspidata.*
the black band of the hindwing sharply dentate; ab. **nigrescens** *R. & J.* (= esulae *Bdv.* nec *Hufn.*), forewing *nigrescens.*
darkened with the exception of a pale oblique band, which is narrow in extreme specimens; ab.
restricta *R. & J.* (= cyparissiae *Schultz*), forewing brownish olive, the pale median area separated into small *restricta.*
spots or almost entirely suppressed; ab. **mediofasciata** *Mayer* differs from ordinary specimens particularly in *mediofasciata.*
a dark band-like median stripe which runs from the costal to the hind margin of the forewing; ab. **bilinea** *bilinea.*
Schultz has, besides, a second shadowy line; in ab. **brunnescens** *Schultz* the median area of the hindwing is brownish *brunnescens*
red, and in ab. **lafitolei** *Th.-Mieg* (41 c) yellow; the black submedian band of the hindwing is absent *lafitolei.*
from ab. **helioscopiae** *Selys* (41 c); specimens in which the band is more or less indicated are more frequent; *helioscopiae.*
in ab. **rubescens** *Garb.* the forewing is rosy, and in ab. **paralias** *Nick.* (41 b) sharply marked and likewise red; *rubescens.*
ab. **gaentzenbergi** *Stdgr.* (41 b) is a very red form which is especially frequent in the Mediterranean countries and *paralias.*
in which the light lateral stripe on head and thorax is reddish. A peculiar form is ab. **viverina** *Denso*, from Vivero *gaentzenbergi.*
in North-Western Spain (Galicia); the costal spots and the basal patch are united together, and the patagia *viverina.*
have usually a white upper margin. — **conspicua** *R. & J.* (41 c). A large pale form which recalls small specimens *conspicua.*
of *nicaea*: costal spot of forewing isolated, strongly marked, the distal margin as pale as the median
area. Underside of body and wings reddish white, much paler than in *euphorbiae verus*. Larva with few or no
pale dots, with 2 rows of ocelli. Syria and Asia Minor. — **robertsi** *Butl.* (= peplidis *Christ.*). Patagia with *robertsi.*
a white upper edge; costal margin of forewing dark, but this border not quite so broad as in *tithymali*.
Underside with little red, yellowish grey, dusted with black. From Transcaspia to Kandahar in Afghanistan.
Larva with 2 rows of ocelli. — **nervosa** *R. & J.* Patagia with white upper edge; abdomen with 2 black *nervosa.*
spots on each side. Costal margin of forewing yellowish olive from the base to the apex, the hind margin of
this border blackish at the base, the dark oblique band traversed by light veins, distal margin pale. Underside
of the wings irrorated with brown, disc reddish, cell of forewing brown with a blackish spot. North-West
India (Sabathu and Simla), presumably also in Southern Kashmir. — **costata** *Nordm.* (41 d). Patagia with *costata.*
white upper margin; abdomen sometimes with a small dark brown lateral spot on segment 4 (recalling *dahli*);
costal margin of forewing broadly yellowish olive-brown, the light median area reduced to a narrow band whose
outer edge is almost straight, in the cell a short pale streak, the dark discal band traversed by pale veins.
Transbaicalia, as well as on the Amur and in Shantung. This subspecies was represented for long in collections
by but a few specimens; lately the missionary L. KLAPHECK has bred it in some numbers.

C. centralasiae. Above and beneath paler than *euphorbiae*; the edges of the abdominal segments beneath
hardly paler than the ground. The dark oblique band of the forewing distally less sharply defined. First
segment of fore tarsus shorter than in *euphorbiae*, with fewer and longer spines. Larva only with one row of
ocelli and without distinct dorsal line. Asia Minor, Transcaspia, North Afghanistan. — **siehei** *Püngeler* (41 c). *siehei.*
The median costal spot of the forewing reduced or almost obsolete. In the Cilician Taurus. — **centralasiae** *Stgr.* *centralasiae.*
(41 c). The median spot of the forewing distinct; sometimes both wings with a reddish tone. Samarkand,
Namangan, Osh, Askhabad, North Afghanistan.

C. gallii. Pulvillus well developed. Scaling of antennae dark, being only pale at the apex. Body and forewing not rosy, the latter darker than in *euphorbiae*, with a broad costal border and rather narrow pale oblique band running from the apex to the hind margin; discal band of hindwing red, in front and behind white. Larva very similar to that of *euphorbiae*, green in the first instar, later often brown; the pale dots always sparse; the ocellus situated at the base of the form always oval. On Galium, Epilobium, etc. The name of the foodplant from which the moth derives its name was formerly frequently spelt Gallium, which explains the ll in the *gallii.* name of the species. Distributed over nearly the entire northern temperate zone. — **gallii** *Rott.* (= galii *Schiff.*) (41 d) is the Palearctic subspecies, which differs from the American form, *intermedia Kirby*, in the greater reduction of the red colouring on the hindwing. From the Atlantic ocean to Japan and the Himalayas, in the spring and again in the summer; in some years abundant, in others sparse; found up to 13 000 ft. in the Hima- *pallida.* layas. In ab. **pallida** *Tutt* the oblique band of the forewing is whitish, in ab. **incompleta** *Tutt* the posterior half of *incompleta.* this band is olive; the black submarginal band of the hindwing is thin in ab. **stricta** *Tutt* and enlarged to the *stricta. lata.* distal margin in ab. **lata** *Tutt*; the dark portions of the forewing are greyish and the red colour is absent from *grisea.* the discal band of the hindwing in ab. **grisea** *Tutt*.

C. nicaea. Similar to *C. euphorbiae*, but the pulvillus is well developed, the first foretarsal segment bears no prolonged spines, the legs are almost as pale beneath as above, the margins of the abdominal segments are beneath hardly paler than the ground, the proximal edge of the dark band of the forewing reaches the hind margin of the wing at a more distal point, and the anal spot of the hindwing has a reddish tone. Larva on Euphorbia; green when young, on each side with 2 rows of black-edged yellow spots; later usually grey, the spots red or deep yellow, often broken up and the black borders confluent; head pale, marked with black; horn black. Moth in the spring and late in the summer. Mediterranean countries, Anterior Asia to *nicaea.* North-West India. — **nicaea** *Prun.* (= cyparissiae *Hbn.*) (41 a). The distal margin of the forewing darker than the median area, the latter more or less irrorated with dark specks. Spain, Southern France, Italy, *crimaea.* eastward to Transcaspia. Specimens from the Crimea with black specks are ab. **crimaea** *Bang-H.* — *castissima.* **castissima** *Aust.* On the whole paler, and the median area of the forewing purer in colour. ab. **carnea** *Aust.* has *carnea. lathyrus.* a reddish tint. Morocco and Algeria. — **lathyrus** *Walk.* (41 d) is a small form from North-West India with dark dusting, the dark oblique band of the forewing moreover being broader than in the previous forms. Occurs presumably also in Kashmir.

zygophylli. **C. zygophylli** *O.* (41 d). Antennae with white scaling. Pulvillus vestigial. Similar to *gallii*; the light oblique stripe of the forewing much narrower, the wing itself also being narrower. Discal band of hindwing red, with a white spot at the abdominal margin. Wings beneath without red. Larva variable, greyish green to brown or greenish black, above with 3 lines, without ocelli, but the subdorsal line sometimes widened on each segment so as to form a spot, or separated into spots. On Zygophyllum. — Known from Southern Russia to North Afghanistan and eastward to the Lob-Nor. The moth in the spring and autumn, the second brood probably incomplete.

vespertilio. **C. vespertilio** *Esp.* (41 e). Body and forewing brownish grey or blue-grey; abdomen with 3 black spots at each side. Forewing only with traces of markings; hindwing red, black at the base and before the distal margin. Pulvillus obsolete. Egg pale green, deposited in pairs (as is probably also the case in *gallii*). Larva without a horn in all stages, ground-colour and markings variable in the later stages, usually brownish grey, on each side a row of large red spots edged with black. On Epilobium, on dry ground with detritus, in daytime under stones. The moth in the spring, in the higher mountains as late as July, a second (incomplete) brood in August and September. Distribution from the South of France to Southern Germany and east- *salmonea.* ward to the Caucasus and Armenia, not known from the Iberian Peninsula and North Africa. ab. **salmonea** *flava.* *Oberth.* has but little red on the median area of the hindwing, and in ab. **flava** *Blach.* this area is yellow. In *murina.* ab. **murina** *Aust.* the forewing has no markings at all, and the median area of the hindwing is densely dusted with grey.

C. hippophaës. Patagia without white upper margin. Abdominal segments not edged with white; on each side of abdomen 2 black spots. The dark olive costal border of the forewing not sharply defined but gradually shading off; the dark median spot small and elongate, or even altogether obsolete; the proximal edge of the dark olive oblique band nearly straight. Hindwing red, the base and a submarginal band black. Larva with a thin horn, without round ocelli, but with pale subdorsal line, at the base of the horn an elongate spot; below the spiracles a conspicuous broad white longitudinal stripe. On Hippophaë; it has a predilection for sunning itself on the highest twigs. From Spain northward to Southern Germany and eastward *hippophaës.* to the Issyk-kul. The moth in the spring and sometimes again in the autumn. — **hippophaës** *Esp.* (41 e). Upperside of body and forewing dark olive; the median spot of the forewing distinct. Spain to the Caucasus; not *bienerti.* known from North Africa. — **bienerti** *Stgr.* (41 e). Much paler, greyish yellow, beneath almost yellowish white; median spot of the forewing above at the most vestigial. From Transcaspia to the Lob-Nor and North Persia.

lineata. **C. lineata.** Abdomen above spotted with white, bearing black and white spots at the sides. Forewing with a narrow light oblique band, the veins pale from the cell to the olive distal margin. Hindwing with a broad red median band which ends with a large white spot at the abdominal margin; submarginal band and base black. Pulvillus present. Egg small, light green. Larva variable, with a complete row of round ocelli, which are traversed by a subdorsal line and sometimes are obsolete, on the back a median line (usually red) and below the stigmata a white line; head and upperside of horn reddish. Sometimes the larva for the greater part black. Pupa elongate, with 2 distinct frontal tubercles, the proboscis-sheath somewhat enlarged at the base. Food-plants: Galium, Linaria, Vitis, Antirrhinum, Rumex, etc. Distributed over the whole of America, Africa, a large portion of Asia and Australia. It is worthy of note that the species does not occur on the Malay Archipelago. — **livornica** *Esp.* (= koechlini *Fuessly*) (41 e). Patagia without a white median streak; abdomen only with 2 large black spots on each side, the other black spots being small. Antenna with brown scaling, the apex white. Arrives every year in Europe from North Africa and sometimes wanders as far as England and Southern Sweden. The species is very common in its native countries, and has doubtless several broods in tropical Africa. This subspecies, which is really an African one, occurs eastward as far as China and Anterior India. — The Australian form of *lineata* is *livornicoides Luc.* (= australasiae *Tutt*), whereas true *lineata* inhabits the whole of America.

livornica.

39. Genus: **Pergesa** *Walk.*

Palpi rough with long hairs at the sides, the scaling on the inner surface as in *Celerio*. Eye-lashes much more distinct than in *Celerio*. Antenna of ♀ less clubbed than in the preceding genus, of ♂ nearly filiform. The spines on the abdomen more numerous and less strongly chitinised than in *Celerio*. Pulvillus always present. — Larva not cylindrical as in *Celerio*, but swollen at the 4th segment and conspicuously tapering from this segment forward; ground-colour green or dark brown; on each side of segments 4 and 5 an ocellus; horn short or almost entirely obsolete. On Galium, Epilobium, Fuchsia, Vitis, etc. Pupa without gloss, tongue-case carinate at the base; abdominal segments 5, 6 and 7 above and at the sides with a basal transverse row of acute granules; cremaster broad and flattened at the base, ending in a long and slender process which is indented at the tip. — Throughout the Palearctic Region with the exception of the higher North, also in North India, but not represented either in Africa south of the Sahara or in America or Indo-Australia.

P. elpenor. Wings entire, fringes without spots. Abdomen yellowish green, a dorsal middle stripe and the underside green, a basal lateral spot black. Forewing like the body, a broad marginal band and two oblique bands red, the proximal band being abbreviated costally. Hindwing proximally black and distally red. Fringes red on the forewing and white on the hindwing. Egg pale green. Larva green or blackish brown, longitudinally pencilled with blackish; ocelli with reniform centre which is open beneath; horn longer than in *porcellus*, blackish brown. Pupation on the ground in a coarse web. Pupa three times as long as broad, greyish brown, dotted with black, wing-cases darker. The moth in Europe in May and June, early specimens again in the autumn; in the warmer districts of the Pacific district of the Palearctic Region a regular second brood appears to occur from Juli onward. — **elpenor** *L.* (= vitis *Oken*, porcus *Retz.*, elenor *Müll.*) (42 a). Distributed from Scotland to the Pyrenees and eastward to the Amur and Korea, the eastern specimens being scarcely distinguishable from the next subspecies (*lewisi*). In ab. **pallida** *Tutt* the ground-colour of the forewing is dull and the red bands are dull purple or violet, while the distal margin of the hindwing is pale; whereas in ab. **virgata** *Tutt* the red colour of the hindwing is restricted to a band which is situated beyond the centre of the wing. ab. **unicolor** *Tutt* has no red bands on the greenish yellow forewing; this extreme form is rare. In ab. *clara Tutt* the red colour is brighter and more extended than in normal specimens. ab. **hades** *Rebel* ([Esper, Pl. 27] = vautrini *Aust.*) is based on the very remarkable specimen figured by Esper, which has the appearance as if it had become discoloured after death; entirely smoky brown, the posterior portion of the thorax and the apex of the abdomen red, the remainder of the upperside of the abdomen yellow. ab. **daubi** *Niepelt*, is almost entirely brown without red; forewing with 2 darker bands, marginal area silvery grey. In ab. **obsoleta** *Tutt* the small white discocellular spot of the forewing is absent. — **lewisi** *Butl.* is the very bright red, and especially beneath extended red, form which inhabits Japan and China. — A further subspecies is *macromera Butl.* from Assam.

elpenor. *pallida.* *virgata.* *unicolor.* *hades.* *daubi.* *obsoleta.* *lewisi.*

P. rivularis *Bdv.* (= fraterna *Butl.*) (42 a). The red portions of the body and wings are shaded with brownish yellow, the red colour being but little distinct. This moth is perhaps also only a geographical race of *elpenor*. Known from Sikkim to Chitral and southward found at Karachi.

rivularis.

P. porcellus. Fringes spotted with brown. Abdomen without black spot at the base. Thorax red, without pale border to the pronotum. Costal margin of the hindwing beneath as well as the costal and distal margins of the forewing above red; hindwing above blackish at the base, greenish yellow in the centre and red at the distal margin. Larva similar to that of *elpenor*, the ocelli round, not reniform, the horn only indicated. Pupa longer than in *elpenor*, the frontal tubercles acute; abdominal segments 5, 6 and 7 with a basal row of pointed granules, the row dorsally somewhat curved forward and the granules dorsally less numerous and less elevate than laterally. Throughout the western Palearctic Region eastward as far as Transcaucasia, not in the high North. — **porcellus** *L.* (= ? bombyliformis *L.*) (42 a). Rather variable. In ab. **clara** *Tutt* the red portions are carmine, and the markings of the hindwing are sharply defined. ab. **scotica** *Tutt* like *clara*, the transverse lines very distinct and the median area and distal marginal band of the hindwing somewhat darkened. ab. **hibernica** *Tutt*, erected for specimens from the West of Ireland, does not appear to be confined to Ireland;

porcellus. *clara.* *scotica.* *hibernica.*

suffusa. lutescens. indistincta. galbana. colossus.

the costal and distal margins of the forewing more greyish red, and the distal marginal band of the hindwing very narrow and red. Specimens in which the hindwing is strongly shaded with black are ab. **suffusa** *Tutt.* In ab. **lutescens** *Cock.* the red colour is replaced by yellow. In ab. **indistincta** *Tutt* the normally red portions are reddish grey, and the marginal band of the hindwing is diffuse and has only traces of red. Finally, in ab. **galbana** *Gillmer* the forewing is extended greenish yellow without red costal spots and transverse band and without dark brown transverse lines. — **colossus** *Bang-H.* (42 b) is larger than *porcellus*; the forewing is less bright red at the costal margin, but is more extended bright red before the hind margin. Algeria. In Mus. Tring from Batna and Les Glacières de Blida, at the latter place collected by us at the lamp early in June.

suellus. **P. suellus** *Stgr.* (42 b). Pronotum with a grey edge. Thorax with distinct grey lateral streak. Abdomen with a yellow lateral spot at the apex of segments 5 and 6. Neither the body nor the wings with bright red colour. Fringes spotted with brown. Forewing with a brown discal band which tapers behind; distal margin of hindwing brown, without red. Costal margin of hindwing beneath grey, irrorated with brown. — Asia Minor and Transcaucasia; occurs in the latter district together with *porcellus*.

askoldensis. **P. askoldensis** *Oberth.* (= cingulatum *Butl.*) (42 a). Larger, thorax with a more obvious greyish white lateral streak, which is distinct also on the head and prothorax; collar edged with grey; abdominal segments with light-coloured mangins. Distal margin in both wings distinctly dentate. Neither above nor below bright red colouration. — Amurland and Japan. Originally described as a *Smerinthus* on account of the dentate wings.

40. Genus: **Hippotion** *Hbn.*

Palpi smoothly scaled on the outside, without the erect hair of *Pergesa*; on the inside the scaling at the apex of segment 1 regularly arranged to form an even border, segment 2 not bearing an apical tuft of scales. Antenna in ♂ not clubbed, in ♀ with distinct club. — Larva anteriorly strongly tapering, segment 4 being swollen. Tongue-case of pupa compressed, cariniform. — The 20 species of this genus occur in Africa and Indo-Australia, one of them entering the Palearctic Region. Many of the Indian species will doubtless be discovered in Palearctic territory, especially in China, although they have not yet been met with in our Region as far as we know.

osiris. **H. osiris** *Dalm.* is a tropical Africal species which is said to have been found in Spain. It resembles *celerio*, but is larger, the stripes of the wings are much brighter and the abdomen bears on each side a black basal spot. For more cf. the African section of this work, vol. 14.

celerio. pallida. brunnea. unicolor. augustei.

H. celerio *L.* (= tisiphone *L.*, inquilinus *Harris*, ocys *Hbn.*, albolineata *Montr.*) (42 b). Distributed over the whole Eastern Hemisphere with the exception of the North. A migrant which wanders northward every year and hence is met with in many districts where it is not indigenous. We have not found any fairly constant geographical races. Abdomen with short oblique lateral silver-streaks and a light median line. Forewing with oblique stripes which run from the apex to the hind margin, a narrow pale discal band ends at the apex and is hardly noticeably widened posteriorly. Hindwing red from the base to the anal angle, the costal area and a submarginal line black, a broad discal band pale red and divided by the dark veins. Larva green or brown, a large ocellus on segment 4, a small one on 5; a pale subdorsal line more distinct in front and behind than on the central segments. On Vitis and Rubiaceae. Pupa glossy; tongue-case large, cariniform; cremaster long-conical, dentate; spiracles black. The moth appears in Europe in the autumn, but is on the wing in the tropics almost throughout the year. Tutt gives the following names: ab. **pallida**, ground pale terracotta; ab. **brunnea**, ground deep brown; ab. **unicolor**, the pale median band of the forewing is so much darkened as not to contrast with the rest of the ground. A further aberration has been described as ab. **augustei** *Trimoul.*, entirely black, markings normal.

41. Genus: **Theretra** *Hbn.*

Palpi smoothly scaled, segment 1 at the apex with a cavity bounded by the scaling, the joint visible in it (sensory organ?); on the inside the scaling at the apex of segment 1 is regular as in *Hippotion*, but segment 2 bears at the apex a tuft of scales directed inward which is absent in all the previous genera. — Larvae and pupae as in *Hippotion*, apart from the differences presented by each species. — 30 species are known, which are all confined to the Old World, the majority inhabiting the Indo-Australian Region. The species found on Palearctic territory are with one exception (*japonica*), Indian species whose area of distribution extends northward to Turkey, China or Japan.

nessus. **T. nessus** *Drury* (42 c). One of the largest species, which is easily recognised by the broad golden lateral stripe of the abdomen. — Distributed from Japan to Ceylon and eastward to New Caledonia, without being split up into subspecies. Somewhat variable individually, especially in size. The blackish brown or green larva has a light-coloured subdorsal stripe which runs from the head to the horn and below which there are pale oblique bands that have the same direction as in the larva of *Sphinx ligustri.* On Dioscorea and Berringtonia. The moth is very common.

boisduvali.

T. boisduvali *Bugn.* (= cretica *Bdv.* pt., punctivenata *Butl.*) (42 d). Greyish yellow; head and thorax with a light stripe on each side; abdomen with 5 weak longitudinal lines, of which the median one is very indistinct. The cavity at the apex of the first segment of the palpus sharply bounded and large. Forewing with 6 dark lines, of which the one running into the apex is usually accentuated on the veins by distinct dots. Hindwing black, distally paler, at the anal angle a greyish yellow patch which is continued costad as a short feebly marked band. — An Indo-Malayan species which extends eastward to Lombok and Borneo and westward to Ceylon, North India, Asia Minor, Crete and Turkey; doubtless a migrant which occasionally reaches South-East Europe, where no specimens have been obtained for a long time. Fairly common in its native countries, but much rarer than the following species.

clotho.

T. clotho. Similar to the preceding species. Abdomen without lines. Forewing with a thick line which ends at the apex of the wing. — The Indo-Malayan subspecies **clotho** *Drury* (42 d) occurs from Ceylon to Japan and eastward as far as Timor, Celebes and the Philippines. The larva is green or brown and bears a large ocellus on segment 4 and a small and blind one on 5—10. On Cissus.

cretica.
alecto.

T. alecto. Reddish grey-brown, or brown-red. Head and thorax with a pale lateral stripe, abdomen with a black basal patch at each side. Hindwing red, the base black, the distal margin brown. Varies individually in the development of the lines on the forewing and abdomen; the line running into the tip of the forewing always distinct. Larva with 7 ocelli, of which the 5 posterior ones are smaller and often almost obsolete; horn short and thick in the last instar. On Vitis, Psychotria, etc. Distributed from Crete to the Key Islands. — **cretica** *Bdv.* (42 e). Pale brown, hindwing less bright red than in the next subspecies. This pale form occurs in Syria, Asia Minor, Transcaucasia, North Persia and Turkestan, and has also been recorded from Crete (whence the type-specimen came). — **alecto** *L.* (42 f) is deep brown, with a very distinct red tone; hindwing bright red. In Afghanistan on Palearctic territory, elsewhere found in India, on Formosa and the Malayan Islands as far as Key and Celebes.

T. suffusa Walk., which is similar, bears broad stripes on the forewing and occurs northward as far as China, but does appear to have reached the valley of the Yang-tse-kiang.

japonica.
suifuna.

T. japonica *Orza* (42 b). Olive-grey. Patagia with a ferruginous median line. Abdomen yellowish at the sides, with a pale dorsal double line. Head and thorax with pale lateral stripe. The cavity at the apex of the first segment of the palpus not very sharply bounded, the scaling around it being somewhat uneven. Forewing striped, a thick double line commences at the costal margin close to the apex and runs to $^1/_3$ of the hind margin, where the line curves basad; at the outer side of this line a pale stripe, which is especially light-coloured behind. Hindwing black costally, pale grey at the abdominal margin; from the anal angle costad extends a diffuse pale band. Larva green or brown; on segment 3 a small white lateral dot, on 4 a white ocellus with black border and brown pupil, on 5 a similar but smaller ocellus, and on 6 a blind round white spot, from 5 or 6 to the horn a pale stripe, below which there are oblique shadowy bands. On Cissus. The moths from the spring until the autumn. The spring-specimens, which are on the whole smaller and paler than the summer-specimens, may be kept separate as f. vern. **suifuna** *Stgr.* (42 e). — The species is known to us from Japan, Amurland, Corea, and China as far south as the Yang-tse-kiang, being a truly Palearctic insect.

oldenlandiae.
silhetensis.

T. oldenlandiae *F.* (42 b), with a white double median line on the abdomen, and **T. silhetensis** *Walk.*, with a simple, sharply marked, white abdominal median line, are widely distributed in the Oriental Region and presumably will also be discovered on Palearctic territory.

42. Genus: **Rhagastis** *R. & J.*

In all the 12 species of this genus the palpi are so much apart that the base of the tongue is visible. The first segment of the palpus bears the same cavity at the apex as in *Theretra*; segment 2 is at the apex at least as broad as segment 1 and bears on the inside an apical tuft of scales. Larva as in *Theretra*. — 2 species are Palearctic, the other 10 Indian resp. Indo-Malayan. The genus does not extend eastward beyond Borneo and Java.

mongoliana

R. mongoliana *Butl.* (42 f). The smallest species. The cavity at the apex of the first palpal segment is almost concealed by the scaling, being much less distinct than in the other species of the genus. Head and thorax with distinct greyish white lateral stripe; on each side of the mesonotum a patch composed of reddish brown and yellow scales; abdomen without stripe at the sides. Forewing sinuate below the apex, with a brown apical spot and another brown spot in front of the hind angle; on the disc 4 rows of dots or lines; the submarginal area sometimes partially greyish yellow. Hindwing blackish brown, with a feebly marked pale band. Larva with 1 ocellus, which is placed on segment 4. Observed on Balsamina. — Japan, Amurland and Corea southward to the Yang-tse-kiang, common.

jordani.

R. jordani *Oberth.* Much larger than the preceding species; the distal margin of the forewing hardly at all incurved below the apex; head and thorax without obvious light lateral stripe; abdomen in contradistinction to *aurifera Butl.* without yellow lateral stripe. Hindwing with a broad greyish yellow submarginal band which is shaded with black costally. Underside with a reddish tint; costal margin of forewing light to the base, not olive-brown like the cell; in the centre a brownish black transverse zigzag line; the olive-brown distal marginal border produced basad in front of the middle, but this pointed projection does not reach the dark basal area. — One pair from Siao-Lu in Western China, in coll. Charles Oberthür.

43. Genus: **Cechenena** *R. & J.*

Differs from the preceding genus in the second segment of the palpus bearing very short scales and therefore appearing much narrower than the first in a lateral view; moreover, the apical tuft on the inside of segment 2 is small. — 6 species, which are all Oriental and of which 1 is met with in our Region.

minor. **C. minor** *Butl.* (= striata *Roths.*) (42 e). Greenish olive-brown, often yellowish ferruginous in places; body with weak but visible stripes. Thorax in contradistinction to *lineosa Walk.* without pale median stripe. Forewing with 6 distinct lines and a submarginal indistinct one, and a black discocellular dot. Hindwing black, the distal margin olivaceous, proximally to it a yellowish grey band which vanishes anteriorly. — Known from Japan to North India, not yet recorded from Corea and Amurland.

Appendix.

Hybrids of Sphingidae.

In nature hybrids between Sphingidae occur as a rule not very frequently, but nevertheless a fair number have been found at large either as larvae or as moths. Since a large number of the most diverse hybrids have been bred in captivity, especially during the last few years, the moths caught in the wild state have been examined more carefully and a systematic search for the caterpillars has been carried out in districts which appeared to promise most success. It is essential for the occurrence of hybrids in nature that two or more species fly at the same time on an area of very small extent. If under such circumstances the one species—A— appears rather earlier than another — B—, hybridisation takes place more easily, at least as regards the species of *Celerio* and *Pergesa*, whose ♂♂ usually emerge from the chrysalis before the ♀♀, so that under normal conditions there are still virgin ♀♀ of A when the first ♂♂ of B appear. There is thus a greater chance for the latter of meeting ♀♀ of A than of B, which favours the possibility of a crossing taking place between B-♂ and A-♀. This seems to occur, e. g., with *Celerio hybr. epilobii Bdv.*, which is the product of a cross *Celerio vespertilio Esp.* ♂ × *Celerio euphorbiae euphorbiae L.* ♀. *C. vespertilio* emerges in nature one or two weeks earlier than *euphorbiae*, and in both species the ♂♂ appear first. *hybr. epilobii*, it may be added, has more frequently been found in nature than any other Sphingid hybrid. The inverse cross, *hybr. densoi*, which is the hybrid A ♂ × B ♀, does not appear to have been observed with certainty in the wild state. Its greater rarity is easily understood from the above explanation.

In order to obtain hybrids in captivity it is advisable to proceed as follows: A sufficiently abundant number of healthy pupae has to be obtained, preferably wild ones. These chrysalisses have to be kept during the winter under conditions which approach as closely as possible the natural surroundings; in the spring, however, the various species must be treated differently. It is essential that the species which one wishes to cross emerge at the same time. In order to obtain this result it is not advisable to force the species which normally emerge late, but to retard the early species by lowering the temperature to a moderate extent. For there is this danger in forcing that, though the moth emerge, their organs of reproduction are not yet fully developed, so that copulation would be without result. It is recommendable to entice by their own ♀♀ the wild ♂♂ required for the cross. The moths are placed in large cages, the ♂♂ and ♀♀ of the same species being kept apart in different cages. In these cages one should put every day fresh flowers such as are attractive for Sphingidae (in the case of species of *Celerio* and *Pergesa*, being unnecessary with species of the *Smerinthus*-group), such as Echium, Salvia, Silene, Lonicera, etc. One can even artificially improve the flowers by putting a drop of honey and water into them. — If many species are kept in the cages, it is necessary to watch personally whether pairing takes place and to protect by some means or other a pair found in copula against being disturbed by the other specimens. Next day the hybridised ♀ is best sleeved on to the live food-plant of the caterpillar of its own species. The bag should not be too large, as otherwise it would be unnecessarily difficult to collect the eggs, which it is advisable to do, as in many cases the young larvae feed on the food-plant of the paternal species. When the larvae have emerged from the eggs, they should be put on to a growing plant and the conditions of life be rendered, if possible, more favourable than in the wild state. The greatest possible care should be taken of the specimens, so as to detect at once the appearance of infectious diseases of the organs of digestion and to take early means of preventing the disease, so frequent among hybrid caterpillars, from spreading. Very often the hybrid larvae suffer from a feeble constitution. This is especially noticeable in the full-fed caterpillars, which are often unable to pupate and frequently do not even make preparations for the pupal stage. There are of course no means of altering that, the breeder of hybrids must be prepared that he will possibly not get a single chrysalis from hundreds of large and apparently strong larvae. This weakness of the constitution is accentuated in the larvae of secundary hybrids. It is advantageous to accelerate the feeding up as much as possible, by raising the temperature if necessary, and by a constant supply of fresh and healthy food. The treatment of the pupae does not require any special remarks. In the case of *Celerio* and *Pergesa* hybrids the moths have a tendency of emerging early, and if they go through the winter they are to be treated like the chrysalisses of the parent species.

Some remarks about the pairing may be added. Although it sometimes appears as if warm sultry nights are particularly favourable for hybridisation, cross-pairing also occurs in cold starry nights. The observations, however, are still insufficient for drawing conclusions as to the influence of the meteorological conditions. It easily suggested itself to do away with the external conditions as well as the perhaps purely individual internal stimulants which cause the moth to copulate, and to try artificial impregnation. However, no success has been attained. Artificial parthenogenesis did not occur, and artificial fertilisation with sperm of the same or other species had no result whatever.

Premary and secondary hybrids as well as crosses between races are so far known of the genera *Mimas*, *Smerinthus*, *Calasymbolus* and *Amorpha* on the one hand and *Celerio* and *Pergesa* on the other. It is easy to understand that hybrids occur rarely in a natural state, by far the greater number of the hybrids known being obtained in captivity. It is often very difficult in the case of wild hybrids to establish the parent species with certainty, the necessary corroboration being often only obtainable by experiment with captive specimens. On the whole the hybrid exhibits a diffuse mixture of the characteristics of the parents, inclining rather more towards the phylogenetically older parent species. However, some cases are known in which the characteristics of the parents were not fused, but appeared side by side like the stones in a mosaic. Frequently the paternal side predominates, but striking anomalies have being observed in this respect, especially among secondary hybrids. As regards the caterpillars, they also exhibit a fusion of paternal and maternal characteristics, but the most noteworthy phenomenon observed at them is „anticipation", that is to say, that the larvae of hybrids reach certain stages in their ontogeny earlier than the larvae of the parent species.

The old rule that the larvae feed on the food-plant of the maternal species has been proved incorrect by a great number of observations, which again renders it difficult to establish the parent species of a hybrid found as larva at large. Another opinion formerly likewise held generally that the wild hybrids are sterile also requires modification. Fertility is indeed very often strongly reduced, particularly in the ♀♀, but nowadays quite a number of secondary and tertiary hybrids are known, which prove that fertility does obtain. However, the generative organs atrophy more and more in the successive generations, even in the case of crosses between races.

I. Hybrids of the Genera Mimas, Smerinthus, Calasymbolus and Amorpha.

A. Primary Hybrids.

M. hybr. **leoniae** *Standf.* (*Mimas tiliae tiliae L.* ♂ × *Smerinthus ocellata ocellata L.* ♀) (43 e). This hybrid *leoniae.* has the elegant shape of *tiliae*, which it resembles closely in facies. It also bears like *tiliae* on the forewing a conical spot beginning broadly in the middle of the costal margin, gradually narrowing, slightly curving towards the distal margin and gradually disappearing towards the hind margin. Between the conical spot and the distal margin there is a diffuse undulate line extending from the costal to the hind margin nearly parallel to the distal margin. From *ocellata* the hybrid has particularly the dark thoracical stripe and the black rounded anal patch of the hindwing, this patch bearing often a bluish grey arc at its upper edge. Between this anal spot and the base the wing has frequently a dull red tone. The ground-colour varies from greyish green or greyish brown to brownish red. Only obtained in captivity.

neopalaearctica. **S.** hybr. **neopalaearctica** *Standf.* (43 e) (*Smerinthus ocellata ocellata L.* ♂ × *Calasymbolus excaecata Abb. & Sm.* ♀). Ground-colour bright red-brown. Has received from *excaecata* the dorsal line, the undulate distal margin of the forewing and the peculiar deep sinus at the distal portion of the costal margin of the hindwing. The sharp definition of the markings of the forewing above and hindwing beneath is derived from *ocellata.* The ocellus of the hindwing is a combination of the *excaecata* and *ocellata* ocelli, but inclines sometimes more towards the one species, sometimes to the other. Only obtained in captivity.

operosa. **S.** hybr. **operosa** *Standf.* (*Smerinthus ocellata ocellata L.* ♂ × *Amorpha populi austauti Stgr.* ♀). Ground-colour varying from light yellowish grey through darker grey tints to brown-red. In the general character of the pattern the hybrid is nearer to *austauti*, but reversions to *populi populi* also are known. Distal margin distinctly undulate, on thorax a broad median spot as in *ocellata.* Median band rather narrow; ocellus of hindwing distinct but strongly reduced. Expanse 72 to 93 mm. Only obtained in captivity.

hybridus. **S.** hybr. **hybridus** *Steph.* (*Smerinthus ocellata ocellata L.* ♂ × *Amorpha populi populi L.* ♀). The general scheme of markings as in *populi*, but the marginal teeth of the forewing shorter than in *populi.* The ocellus of the hindwing very variable, consisting usually of a large, more or less deep black spot which gradually fades away into the ground-colour, and bears a black centre of very variable size. The brown basal patch of *populi* is indicated by a light brown tone. The thoracical spot of *ocellata* is present, but less distinct. Known in the wild state, and often bred in captivity.

oberthueri. **S.** hybr. **oberthueri** *Tutt* (43d) (*Smerinthus ocellata atlanticus Aust.* ♂ × *Amorpha populi austauti Stgr.* ♀). In facies so similar to the inverse hybrid *metis* as to be easily mistaken for it, the scheme of markings being almost identical, except that it is usually more pronounced in *metis*, the subbasal undulate line of the forewing especially being more obvious in *metis.* The markings of the hindwing are more diffuse in *oberthueri*, the ocellus being more variable, the basal area less strongly red, and the blackish colouring around the ocellus less prominent. The forewing of *oberthueri* is more elongate, the apical portion of the costal margin more rounded, and the dentition of the distal margin less strong than in *metis.* The specimens of *oberthueri* have on the whole a greater expanse than hybr. *metis.* Hitherto only obtained in captivity.

fringsi. **S.** hybr. **fringsi** *Standf.* (43e) (*Smerinthus ocellata atlanticus Aust.* ♂ × *Amorpha populi populi L.* ♀). Resembles more *populi* than *atlanticus.* It has retained from *populi* the broad wings which are distinctly undulate at the distal margins, and in the main also the general colouration and the scheme of markings. From *atlanticus* it has the often only very feebly marked ocellus of the hindwing, which is densely bluish grey in a dark field, and the reddish shade in the basal area of the forewing beneath, which is present in most specimens. Some examples show also a slight darkening on the thorax. Only obtained in captivity.

interfaunus. **C.** hybr. **interfaunus** *Neumög.* (*Calasymbolus astylus Drury* ♂ × *Smerinthus ocellata* ocellata *L.* ♀). Differs from *ocellata* in the distal margin of the forewing not being sinuate. The discal spot is only slightly indicated, and the transverse lines are but feebly undulate. The ocellus of the hindwing smaller than in *ocellata.* Colour of the forewing intermediate between the tints of *astylus* and *ocellata.* On the thorax a broad brown longitudinal line as in *astylus.* Only obtained in captivity.

varians. **A.** hybr. **varians** *Standf.* (43d) (*Amorpha populi austauti Stgr.* ♂ × *Smerinthus ocellata ocellata L.* ♀). There are no constant differences from hybr. *operosa*, but *varians* is still more variable and on an average larger. Moreover, the forewing has in most examples a broader median band. Expanse 81 to 98 mm. Only obtained in captivity.

metis. **A.** hybr. **metis** *Aust.* (43 e) (*Amorpha populi austauti Stgr.* ♂ × *Smerinthus ocellata atlanticus Aust.* ♀). Ground colour usually reddish grey, scheme of markings as in *austauti.* As already mentioned under hybr. *oberthueri*, the markings of *metis* are on the whole more prominent, particularly the first proximal undulate line of the forewing is much better marked. The distal margins are more deeply sinuous. Specimens which *deleta.* resemble *populi austauti* in the less reddish colour and the paler markings are **deleta** *Aust.*

rothschildi. **A.** hybr. **rothschildi** *Standf.* (*Amorpha populi populi L.* ♂ × *Smerinthus ocellata ocellata L.* ♀). Very closely resembling *populi*, the ocellus of the hindwing absent, but there is a dark tone at the anal angle. In the shape of the wing and in their dentition there is a slight resemblance to *ocellata*, the thorax also showing a feeble darkening derived from *ocellata.* Only two sexually atypical ♂♂ obtained in captivity by Standfuss. *inversa.* — The specimen recorded by Tutt as hybr. **inversa** was only a slightly aberrant *populi.*

carelica. **A.** hybr. **carelica** *Denso* (*Amorpha populi populi L.* ♂ or ♀ × *Amorpha amurensis amurensis Stgr.* ♀ or ♂). Only one specimen known, captured at large. Expanse 79 mm. Shape of wings as in *populi*, dentition of the margins less prominent. The markings of the upperside diffuse (similarly as in *amurensis*). The ground-colour of the forewing brown, grey towards the base; the grey stripe which runs from the costal to the hind margin is nearly quite straight as in *amurensis*, not being undulate as in *populi*. The hindwing has the same brown ground-colour as the forewing and bears a red-brown basal patch, which is much smaller than in *populi* and essentially larger than the minute traces of the spot which are very rarely met with in *amurensis*. The underside as in *amurensis*; there are no distinct markings, but at the apex and hind angle only some diffuse small spots which are paler than the ground.

B. Crosses between Races.

1. Between *Smerinthus ocellata ocellata L.* and *Smerinthus ocellata atlanticus Aust.*

charlotta. **S.** f. (hybr.) **charlotta** *Dannenberg* (*Smerinthus ocellata atlanticus Aust.* ♂ × *Smerinthus ocellata ocellata L.* ♀). In facies nearer to *atlanticus*, which it also approaches in size. General colouration of the forewing a dull yellowish grey. The grey colour of the costal margin of the hindwing rather pale, all the red tones somewhat duller than in *ocellata*. The markings of the forewing stronger than in *atlanticus*, but more diffuse than in *ocellata*. The ocellus large and broad, margined with black. The thoracical patch halfway between those of *ocellata* and *atlanticus*. Obtained in captivity.

gertrudis. **S.** f. (hybr.) **gertrudis** *Dannenberg* (*Smerinthus ocellata ocellata L.* ♂ × *Smerinthus ocellata atlanticus Aust.* ♀). Approaches *atlanticus* like *charlotta*, but less closely. Markings stronger than in *charlotta*, costal margin of the hindwing darker, the red tone stronger. Forewing more pointed. Underside of wings darker than in *charlotta*. Expanse larger in *gertrudis*. Obtained in captivity. Specimens obtained from pupae kept cool and hibernating are, both in this hybrid and *charlotta*, especially large and dark.

2. Between *Amorpha populi austauti Stgr.* and *Amorpha populi populi L.*

(All obtained only in captivity.)

darwiniana. **A.** f. (hybr.) **darwiniana** *Standf.* (*Amorpha populi austauti Stgr.* ♂ × *Amorpha populi populi L.* ♀).

langi. **A.** f. (hybr.) **langi** *Standf.* (*Amorpha populi populi L.* ♂ × *Amorpha populi austauti Stgr.* ♀). Both crosses combine the characteristics of their parents, both however incline towards *populi*. Above all they have retained the great variability of *populi* in the general tint of colouration. The moderately deep indentations of the distal margins of the wings and the large size are inherited from *austauti*.

densoi. **A.** f. (hybr.) **densoi** *Standf.* (*Amorpha populi populi L.* ♂ × *Amorpha populi* f. (hybr.) *darwiniana Standf.*). Extremely variable. Distal margins of wings varying from being feebly undulate to being sharply dentate. Markings sharply defined or diffuse. Ground-colour light grey to dark grey. Shape of wings usually approaching that of *populi*. Generative organs reduced to a greater or lesser extent. Expanse: ♂ 73 to 92 mm, ♀ 82 to 96 mm.

populiformis. **A.** f. (hybr.) **populiformis** *Standf.* (*Amorpha populi populi L.* ♂ × *Amorpha populi* f. (hybr.) *langi Standf.* ♀). The specimens which emerge before hibernation are different from those which leave the chrysalis after hibernation. The former have no teeth to the distal margins and feebly developed markings, the ground-colour about midway between that of light grey *populi* and yellowish whitish grey *austauti gen. aest. staudingeri*. The specimens appearing after hibernation of the pupa approach *populi* in the stronger dentition of the distal margins, sharper markings and the usually slaty grey ground-colour. Generative organs sometimes strongly atrophied. Expanse: ♂ 74 to 85 mm, ♀ 81 to 90 mm.

austautioïdes. **A.** f. (hybr.) **austautioïdes** *Standf.* (*Amorpha populi austauti Stgr.* ♂ × *Amorpha populi* f. (hybr.) *darwiniana Standf.* ♀). Dentition of distal margins of wings feeble, but more distinct than in *austauti*. The markings strongly reduced in extent and but feebly expressed. The ground-colour exceedingly variable, the light grey to reddish tones of the summer-brood *staudingeri* of *austauti* and its f. *mirabilis*, as well as the dark grey and dark reddish tints of *populi* occurring. On the whole this cross much approaches the forms of *austauti*. Generative glands atrophied. Expanse: ♂ 85 to 87 mm, ♀ 86 to 107 mm.

roepkei. **A.** f. (hybr.) **roepkei** *Standf.* (*Amorpha populi* f. (hybr.) *langi Standf.* ♂ × *Amorpha populi* f. (hybr.) *langi Standf.* ♀). Strongly reduced. Distal margins usually obviously dentate. Markings feebly expressed. Ground-colour usually grey, sometimes reddish. Generative glands anomalous to deformed. Expanse: ♂ 76 to 79 mm, ♀ 77 to 87 mm.

turatii. **A.** f. (hybr.) **turatii** *Standf.* (*Amorpha populi* f. (hybr.) *darwiniana Standf.* ♂ × *Amorpha populi* f. (hybr.) *darwiniana Standf.* ♀). Extremely variable. Distal margins feebly undulate to excessively sharply dentate, sometimes produced into sharp points; markings always weakly developed, particularly so in the pale grey specimens. Ground-colour very variable, usually light white-grey, but sometimes slaty grey. One specimen bright coppery red. In the whitish grey examples the red-brown basal patch of the hindwing is visibly reduced. Generative glands strongly atrophied. Expanse: ♂ 67 to 82 mm, ♀ 67 to 82 mm.

C. Secondary Hybrids.

(All only obtained in captivity).

daubi. **S.** hybr. **daubi** *Standf.* (*Smerinthus ocellata ocellata L.* ♂ × *Amorpha populi* f. (hybr.) *langi Standf.* ♀). Two obviously different series were bred from two pairings. The first series contained, besides two gynandromorphic examples, only ♂♂ expanding 68 to 84 mm: distal margins strongly dentate, undulate lines very strongly marked; the blue ocellus of the hindwing and the thoracic median spot are strongly obsolescent; the ground-colour is lighter or darker slaty grey. The second series contains only normal-sized ♂♂ of 79 to 89 mm expanse; the dentition of the distal margins indistinct, undulate lines but little sharp or diffuse, ocellus of the hindwing large but dull; on the middle of the thorax a distinct darkening; the ground-colour a peculiar bluish grey.

philippsi. **A.** hybr. **philippsi** *Standf.* (*Amorpha populi* f. (hybr.) *darwiniana Standf.* ♂ × *Smerinthus ocellata ocellata L.* ♀). Only ♂♂ of 74 to 91 mm expanse were obtained. Ground-colour dark blackish grey with a slight violet tint. Distal margins usually obviously sinuous, the undulate lines sharply defined and distinct; the black anal patch of the hindwing is exceptionally large and very deeply coloured, the blue ocellus placed in it very variable in size. The dark thoracic spot usually strongly developed.

emiliae. **S.** hybr. **emiliae** *Standf.* (*Smerinthus ocellata ocellata L.* ♂ × *Amorpha populi* f. (hybr.) *darwiniana Standf.* ♀). Two ♂♂ of 74 and 77 mm expanse. Very narrow-winged, delicate moths, with only slight indications of *ocellata*-markings. Distal margins of wings undulate-dentate; the blue ocellus of the hindwing only feebly indicated and diffuse; the thoracical spot entirely absent; undulate lines not sharply defined; ground-colour somewhat paler than in normal *populi*.

II. Hybrids of the genera Celerio and Pergesa.

A. Crosses between races of the Celerio euphorbiae group.

walteri. **C.** f. (hybr.) **walteri** *Turati* (*Celerio euphorbiae dahli Hbn.-G.* ♂ × *Celerio euphorbiae euphorbiae L.* ♀). The moth entirely resembles in facies a pale *dahli*, having inherited from *dahli* particularly the following characteristics: above all the 3 pairs of very distinct lateral abdominal black spots, which are present in all specimens, further the prominent white border of the patagia, and the feeble white dorsal line. Also the strongly white-scaled veins are a *dahli*-character, though they occur also not very rarely among *euphorbiae*. Further, the shape of the basal costal spot of the forewing is derived from *dahli*, as well as the small, linear spot, which is more directed towards the centre of the wing and is exceedingly rare in *euphorbiae*. Some traces of the atavistic line *) are visible. From *euphorbiae* are derived especially the shape of the two spots near the base and middle of the costal margin and the broad pale median area. The underside of the wings closely resembles that of *dahli*. Only obtained in captivity.

wagneri. **C.** f. (hybr.) **wagneri** *Denso* (*Celerio euphorbiae mauretanica Stgr.* ♂ × *Celerio euphorbiae euphorbiae L.* ♀). This cross strongly recalls *mauretanica*. The costal margin is very broadly olive-green, much more broadly so than in f. (hybr.) *walteri*, the distal costal spot being completely absorbed by this border and the median costal spot confluent with it. The small spot near the basal patch is distinctly marked. The distal edge of the oblique band is not so dentate as in *euphorbiae*, but is shaped more nearly as in *mauretanica*. The red of the hindwing, too, is of the same tint as in *mauretanica*. The black basal area of the hindwing as well as the black submarginal band are particularly strongly developed. The underside of the wings with a feeble yellowish pink tint, without markings. — Only obtained in captivity.

giesekingi. **C.** f. (hybr.) **giesekingi** *Turati* (*Celerio euphorbiae euphorbiae L.* ♂ × *Celerio euphorbiae dahli Hbn.-G.* ♀). This cross, the inverse of f. (hybr.) *walteri*, distinctly inclines towards *euphorbiae*, although it also possesses *dahli*-characteristics, but in a lesser degree than *walteri*. The olive-green colour of the costal margin of the forewing is almost as in *walteri*, but the distal costal spot more nearly resembles that of *dahli*. The small accessory spot near the base, an inheritance from *dahli*, is feebly marked. The patagia are not bordered with white; the dorsal line is not present, and the third pair of abdominal spots, which is so characteristic of *dahli* and *walteri*, is but very slightly indicated. Hardly any traces of the atavistic line *) preserved. — Only obtained in captivity.

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*) In pure species, but more frequently in Hybrids, there occurs often an atavistic line which is most strongly marked at the distal costal spot placed at $^3/_4$ and runs from there to the hindmargin, being nearly parallel with the proximal margin of the oblique band.

turatii.

C. f. (hybr.) **turatii** *Denso* (*Celerio euphoribiae euphorbiae L.* ♂ × *Celerio euphorbiae mauritanica Stgr.* ♀). This might easily be mistaken for an only slightly aberrant *euphorbiae* from a southern district, were its descent from f. *turatii* not established with certainty by the copulation in captivity. The costal margin of the forewing is only slightly suffused with olive-green, so that the middle and outer costal spots are distinctly prominent. The colour of the very broad central and marginal areas is yellowish pink. The oblique line, the first two-thirds of which are very narrow, becomes broad at the hind margin. — Only obtained in captivity.

B. Primary Hybrids.

kindervateri.

C. hybr. **kindervateri** *Kysela* (43 a) (*Celerio euphorbiae euphorbiae L.* ♂ × *Celerio gallii gallii Rott.* ♀). Costal margin broadly olive-green as in *gallii*, but the small basal accessory spot which in *gallii* is especially strongly marked is separated from the costal border and is well developed. The central costal spot is as in *gallii*, the outer one obsolete. The shape of the olive-green oblique band — which in *gallii* is very broad at the hind margin and projects far basad, and also is always strongly concave in its second third, then curving off convexly to the hind margin — more nearly approaches that of *euphorbiae*, the concavity being absent. The atavistic marginal line running from the apex to the hind angle, which is nearly always present in *gallii* but rarely in *euphorbiae*, is distinct. Hindwing with strongly black base and broad black submarginal band, disc of the same deep red as in *euphorbiae*, only slightly lighter from the costal margin. Head, thorax and abdomen olive-green, the dorsal line only slightly indicated, the last abdominal segments also only faintly edged with white. Antennae slightly tinged with olive-green and with a white tip. Underside of wings very like *gallii*, but slightly suffused with yellow-red. Tarsi with a very small pulvillus. — Larva very variable, rarely with 2 rows of lateral spots, the upper row often reddish. — Obtained in captivity, also found in nature.

epilobii.

C. hybr. **epilobii** *Bdv.* (*Celerio euphorbiae euphorbiae L.* ♂ × *Celerio vespertilio Esp.* ♀). Hybr. *epilobii* and the inverse hybrid *densoi* resemble each other very closely, so that if one has no exact information as to the parentage of a specimen, one might be doubtful to which of the two forms it belongs. But in comparing a large number of the moths the characteristic differences are quite distinctly recognizable. They are as follows: In *epilobii* the ground-colour is less dusted with grey atoms, the markings, easily recognized as being those of *euphorbiae*, are fairly distinctly coloured dull olive-green. The hindwing bears a well-developed anal spot. The black submarginal line also well-defined and varying in size and position. Specimens of *epilobii* suffused with red are also found, corresponding to the red forms of *euphorbiae*; they are named ab. **rubella** *Kysela*. A rare form with greyish black instead of olive-green markings and light grey ground-colour may be called ab. **nigrescens** *ab. nov.* — Larva exceedingly variable, with one or two rows of lateral spots. Horn short. — Obtained in captivity. Found in nature near Grenoble, Geneva, S. Tyrol, Hüningen in Alsace, Vienna.

rubella. *nigrescens.*

euphaës. *pauli.*

C. hybr. **euphaës** *Denso* (43 a) (*Celerio euphorbiae euphorbiae L.* ♂ × *Celerio hippophaës hippophaës Esp.*) ♀ (hybr. **pauli** Mory [?]). Specimens obtained from a copula *euphorbiae* ♂ × *hippophaës* ♀ in captivity differ from hybr. *pauli Mory* in many respects. The moth which Mory believed to be hybr. *euphorbiae* × *hippophaës* and described as hybr. *pauli* was obtained from a wild larva found in the Valais on Hippophaë rhamnoïdes. The hybrids obtained in captivity from the copula *euphorbiae* ♂ × *hippophaës* ♀ have a narrow dark olive-green costal margin. The basal costal spot, which is more rounded, as in *euphorbiae*, and not pointed as it is in *hippophaës*, is also dark olive. The lower black basal spot placed below it is very small. The middle costal spot, an indistinct smear in *hippophaës*, is definitely bounded, and the black spot at the cross-vein, very sharply marked in *hippophaës*, is also distinctly present. The outer costal spot is only slightly indicated. The median area is broad, yellowish brown. The oblique band is convex taken as a whole, and never curves distinctly towards the hind margin as in *euphorbiae*, its distal edge being sharply defined and dentate. The black basal spot of the hindwing is separate from the submarginal band and smaller than in *hippophaës*, where it is united along the costal margin with the black submarginal band, the latter having a diffuse inner edge. The oblique band has a sharply defined proximal edge. *pauli* is distinguished by a much broader costal margin on the forewing, by the basal spot not being round but angular as in *hippophaës*, by the absence of the dot at the cross-vein and by bearing a very distinct middle costal spot. Moreover, the median area is very light, whitish grey. The oblique band runs as in *euphorbiae*, is sharply defined distally and the veins traversing it are dusted with white. As to the hindwing, in *pauli* the basal spot and submarginal band are united, and the latter has an indistinct edge. It should also be mentioned that the larva of *euphorbiae* ♂

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*) Cf. foot-note p. 264.

× *hippophaës* ♀ bears a striking resemblance to that of *euphorbiae* and feeds on Euphorbia, while of the only known larva of *pauli* we know that it was found on Hippophaë rhamnoïdes.

harmuthi. C. hybr. **harmuthi** *Kordesch* (43 a) (*Celerio euphorbiae euphorbiae L.* ♂ × *Pergesa elpenor elpenor L.* ♀). Costal border broad and dark olive-green, merging into red apically. The oblique band, which has usually a very distinctly convex inner edge in *elpenor*, is distinctly concave in its second third owing to being very broad at the hind margin. The light olive-green *elpenor*-line is very broad, dark olive-green, and somewhat diffuse distally. This line runs parallel with the proximal edge of the oblique band and corresponds to the atavistic line of the species of *Celerio*, which line begins at the outer costal spot and runs to the hind margin of the forewing almost parallel with the inner edge of the oblique band. The area between it and the oblique band which in *elpenor* is mauve-pink is light pink. The lower black basal spot is only faintly indicated, distally of it there is a deep red patch reaching as far as the faintly indicated median costal spot. The black discocellular dot is usually present. The hindwing is pink, with a very broad black base and an olive-green diffuse marginal band. The anal spot, which is bright white in *euphorbiae*, and not present in *elpenor*, is slightly indicated and light pink, the marginal band is light pink, thorax and abdomen dark olive-green, the patagia are slightly margined with a reddish tint. The underside of the wings reddish, at the costal margin in the second third near the apex a light olive-green spot, from which two parallel blackish green lines run to the hind margin, there being two corresponding olive-green lines on the hindwing. In ab. **griseofasciata** *Kysela* the patch proximal to the oblique band of the forewing, usually pink, is grey and much broader. The hindwing bears a strongly marked black marginal band. — As yet apparently only obtained in captivity.

galiphorbiae. C. hybr. **galiphorbiae** *Denso* (43 a, c) (*Celerio gallii gallii Rott.* ♂ × *Celerio euphorbiae euphorbiae L.* ♀). Compared with the inverse cross hybr. *kindervateri*, *galiphorbiae* inclines more towards *gallii*. The basal accessory spot is closely united with the broad olive-green costal margin. The olive-green oblique band bears the concavity typical of *gallii*, but in a lesser degree. The lower black basal spot is more strongly developed than in *kindervateri*. The hindwing is more yellowish red, which gets darker towards the anal angle. The yellowish underside of the wings is very like that of *gallii*. The white dorsal line is nearly always distinctly present. The *phileuphorbia.* pulvillus is small. The moth named hybr. **phileuphorbia** by Mützel and considered to be hybr. *gallii* × *euphorbiae* is distinguished from *galiphorbiae* especially by the very characteristic oblique line; with respect to its course it stands between *gallii* and *galiphorbiae*. The pulvillus is large, as in *gallii*. The white dorsal line is absent. — The larvae of *phileuphorbiae* were remarkably like those of *gallii*, but fed on Euphorbia. The larvae of *galiphorbiae* are so like those of *euphorbiae* that they might be mistaken for them; *phileuphorbiae* seems to be a secondary hybrid. The moths of *galiphorbiae*, only four being as yet known, are distinguished by their unusual size. Their pupae lie over for years and only emerge if some specially strong factor comes into play. The full-grown larva often only bears one row of lateral spots, the upper row being usually more reddish than in *euphorbiae*, and on the whole more closely resembles the larva of *gallii*. — Often obtained in captivity, occurrence in nature doubtful; *phileuphorbiae* was found in nature.

galitanica. C. hybr. **galitanica** *Denso* (*Celerio gallii gallii Rott.* ♂ × *Celerio euphorbiae mauretanica Stgr.* ♀). Distinguished from hybr. *galiphorbiae* by the light straw-coloured ground-colour being more broadly extended apicad at the costal margin, the olive-green oblique band is also very steep before the hind margin and is deeply concave in its last third. The red colour of the hindwing stronger, the black submarginal band is narrower and more irregular, the marginal area broader. Antennae lighter. Full-grown larva very light in colour on account of the very large striated spots. Subdorsal spots peach-red, the second row, when present, only consists of small spots. Pupa similar to that of *gallii*. — Only bred in captivity.

carolae. C. hybr. **carolae** *Kysela* (43 b) (*Celerio gallii gallii Rott.* ♂ × *Celerio vespertilio Esp.* ♀). According to the original description this hybrid has the same scheme of markings as *gallii*, but somewhat diffuse and dark greyish olive on a grey ground. The hindwing has a black basal area corresponding to that of *gallii* and a uniformly red band, which is bounded by a grey submarginal band. The anal spot is distinct, white. The antennae resemble those of *gallii*. The greyish olive abdomen bears two black-white lateral spots, the segmental incision are edged with white, and there is an only faintly indicated dorsal line. Larva black-brown, without subdorsal line, spots pale pink, small white striated spots. Horn short. On the whole it resembles the larva of *gallii*. — As yet only obtained in captivity.

kramlingeri. C. hybr. **kramlingeri** *Pernold* (*C. vespertilio Esp.* ♂ × *C. gallii gallii Rott.* ♀). Forewing extraordinarily dark, but the *gallii*-markings distinctly recognisable. The oblique band not projecting as far basad at the hind margin as in *gallii*. Hindwing with carmine median band, which is more uniformly coloured than in *gallii*, being usually only very slightly lighter at the costal margin. Antennae white or brownish black with white apex. Thorax and abdomen blackish olive-grey. Dorsal line not present. Underside of wings recalling *gallii*, very variable.

gschwandneri. C. hybr. **gschwandneri** *Kordesch* (43 b) (*Celerio gallii gallii Rott.* ♂ × *Pergesa elpenor elpenor L.* ♀). Costal margin very broadly suffused with olive-green. At the apex a yellowish pink lighter patch. The lower black basal spot small. The basal area, which is light pink in *harmuthi*, is smaller, grey. The atavistic line, running from the outer costal spot to the hind margin almost parallel with the oblique band, is strongly developed, the area between it and the oblique band is yellowish pink and strongly narrowed in its hindmarginal portion on account of the olive-green oblique band projecting towards the base at the hind margin. The inner edge of the oblique band shows distinctly the concavity derived from *gallii*. The marginal area greyish lilac, often with traces of the line from apex to hind margin. The black discocellular spot is present. The hindwing bears a broad black base and a yellowish pink band almost imperceptibly lighter at the anal angle. The submarginal band is greyish black, diffuse, on the inner side often slightly edged with olive; being so broad, the dull pink marginal area is very narrow. Thorax olive-green with reddish hair on the patagia. Antennae nearly white, very faintly suffused with olive. Abdomen olive-green, with one pair of black lateral spots. Segmental incisions laterally bearing a few hairs, pink and yellow in colour. The underside of the wings is a perfect mixture of *gallii* and *elpenor*, but the black hairs on the basal area of the forewing, derived from *elpenor*, are very strongly developed. — As yet only obtained in captivity.

densoi.
rubescens.
salmonea.
reisleitneri.

C. hybr. **densoi** *Muschamp* (43 b) (*Celerio vespertilio Esp.* ♂ × *Celerio euphorbiae euphorbiae L.* ♀). Compared with *euphorbiae*, hybr. *densoi* is conspicuous in that the ground-colour of the forewing is very strongly dusted with grey, so that on the whole it presents a darker appearance than hybr. *epilobii*. The dark grey oblique band runs almost as in *euphorbiae*, the costal spots are also distinct, but the outer one is usually much less developed than in *epilobii*. The atavistic line running from the outer costal spot to the hind margin almost parallel to the oblique band appears in nearly every specimen as an indistinctly bounded black-brown stripe. The marginal area is of the same dark colour as the median area, the latter being much more rarely lighter at the inner edge of the oblique band than in *epilobii*. The red colour of the hindwing is more like that of *vespertilio*, the black submarginal band is broad and stands close to the outer margin. In very rare cases the third pair of black abdominal lateral spots derived from *vespertilio* is present. Specimens with reddish ground-colour, such as also occur in *epilobii*, may be named f. **rubescens** *form. nov.* It is known that specimens of *densoi* occur with a salmon-coloured band on the hindwing, having the same colour as *Celerio vespertilio* f. *salmonea Oberth.* We may unite these also under the name f. **salmonea** *form. nov.* Very rare specimens with chrome-yellow band on the hindwing have been named f. **reisleitneri** by Kysela. Larva usually with two rows of subdorsal spots, the upper ones reddish. Horn very short. — Often obtained in captivity. Its occurence in nature is not yet established beyond doubt.

vespophaës.

C. hybr. **vespophaës** *Denso* (*Celerio vespertilio Esp.* ♂ × *Celerio hippophaës hippophaës Esp.* ♀). Markings very like those of *hippophaës*, but the costal margin much broader and darker, at the median area very gradually merging into a lighter colour, which colour is only slightly marked. Oblique band less distinct than in *hippophaës*, general colouring more grey, much darker than in *vespertilioides*. — Found in nature. — Larvae obtained in captivity closely resemble *vespertilio* in ground-colour. The subdorsal spots of the anterior segments are absent, the others small, pink, those of the caudal segment best developed. On the anterior segments there are traces of the subdorsal lines. Horn short, straight.

vespelpenor.

C. hybr. **vespelpenor** *Denso* (*Celerio vespertilio Esp.* ♂ × *Pergesa elpenor elpenor L.* ♀). In this remarkable moth we meet with the same scheme of markings which is found in all hybrids derived from *elpenor*, but the markings are naturally very indistinct. The broad costal border, the atavistic line, running from the outer costal spot to the hind margin almost parallel to the inner edge of the oblique band, and the oblique band are dark greyish green-olive in colour, the basal, median and marginal areas show slight traces of pink scaling. The hindwing has a very broad black base, upon which follows the dull pink transverse band, with a slightly suffused submarginal band gradually disappearing anally and not leaving any room for a marginal area. Head, thorax and abdomen also dull green olive, at the edges of the patagia sparse reddish hairs. Only one pair of black lateral abdominal spots. Underside similar to that of *vespertilio*, but with a pair of dark olive-green transverse lines derived from *elpenor*.

hippophorbiae.

C. hybr. **hippophorbiae** *Denso* (43 d) (*Celerio hippophaës hippophaës Esp.* ♂ × *Celerio euphorbiae euphorbiae L.* ♀). Costal border less broad than in *hippophaës* and also more greenish. Basal spot not projecting so far as in *hippophaës*, and without the point of the latter. Lower basal spot smaller than in *hippophaës*, but larger than in the inverse hybrid. Central costal spot in the form of a smear as in *hippophaës*, but more strongly developed. The black dot at the discocellular vein is distinctly present, but the outer costal spot is entirely absent. The yellowish grey median area is lighter and yellowish pink along the inner edge of the oblique band, as is often the case in *hippophaës*. The oblique band runs as in *hippophaës*, but is steeper in front of the hind margin. Its distal edge is diffuse as in *hippophaës*. On the hindwing the large black basal spot is united at the costal margin with the diffuse-edged broad submarginal line. The transverse band is bright red, the marginal band, however, is light pink. The underside of the wings is like that of *hippophaës*, but it is of a deeper red, and the marginal areas of the wings are not grey, but reddish lilac. — Larva usually with two rows of lateral spots, the lower spots being very small, and with a red dorsal line and reddish yellow stigmatical one. — Only obtained in captivity.

vespertilioïdes. **C.** hybr. **vespertilioïdes** *Bdv.* (43 b) (*Celerio hippophaës hippophaës Esp.* ♂ × *Celerio vespertilio Esp.* ♀). In facies very similar to hybr. *vespophaës*, but the median area more extended pale, the costal border narrower, and the entire colouring somewhat lighter. The oblique band is more distinct than in *vespophaës.* The atavistic line running from the posterior costal spot to hind margin almost parallel with the inner edge of the oblique band appears to be present in some specimens. The discocellular dot is present and beside it there are traces of the smear-like middle costal spot derived from *hippophaës.* — The ground-colour of the larva is apparently lighter and of a more greenish tone than in *vespophaës*; there is a distinct line at the stigmata which is white and light red. Food-plant: Epilobium. — Whether this hybrid ought not perhaps more correctly to be called **amelia** *Feisth.*, can only be decided by breeding in captivity, which has yet not been carried out sucessfully.

amelia.

gillmeri. **C.** hybr. **gillmeri** *Rebel* (43 b) (*Celerio lineata livornica F.* ♂ or ♀ × *Celerio zygophylli O.* ♀ or ♂). Costal margin of forewing broadly brown. The small black discocellular spot is placed in a light yellowish brown patch. The median band is, like that of *livornica*, reduced to a narrow light yellowish brown band pointed at the apex and broader posteriorly at the hind margin near the base. The brown oblique band is slightly curved proximally and reaches hind margin between middle and base. Its outer edge is not dentate, but nearly straight as in *livornica.* The veins are partly pale, especially within the oblique band. The hindwing have a broad black basal area, a pronouncedly red median band which bears a distinct white patch near anal angle, and a broad black submarginal band which is distally bordered by a slightly red marginal area. The thorax and head are prominently white-hairy at the sides, and the patagia bear a broad white border. There are 2 pairs of black and white abdominal spots, and the edges of the segments are slightly white. The underside is feebly yellowish pink, being more brownish at the costal margin of the forewing and the distal margins of both wings, bearing here small but thick striae. The basal area of the forewing has a trace of black hair, and the dark cloud which corresponds to the middle costal patch of the upperside is distinctly marked. — One specimen caught at light at Posen.

elpotanica. **P.** hybr. **elpotanica** *Denso* (*Pergeso elpenor elpenor L.* ♂ × *Celerio euphorbiae mauretanica Stgr.* ♀). Very closely resembling hybr. *pernoldi*, the differences being exactly those which might have been expected. Colour of forewing red and olive-green, differing from *pernoldi* in the costal margin having a broader olive-green border and in the olive-green oblique band being more basal at the hind margin. The different colours contrast more than in *pernoldi.* The black discocellular dot is usually present. The hindwing has a very large black basal area, then follows a bright red transverse band which is white towards anal angle and is distally bordered by a black-green submarginal band less strongly developed than in *pernoldi.* The very narrow marginal area is red. The underside of the wings is much paler red than in *pernoldi*, the pair of olive-green transverse lines much weaker, and the black hair extending from the base of the forewing outward has disappeared. — Larva very similar to that of *pernoldi*, but the subdorsal line is usually indicated by slight reddish tint. — Obtained in captivity.

pernoldi. **P.** hybr. **pernoldi** *Jacobs* (43 c) (*Pergesa elpenor elpenor L.* ♂ × *Celerio euphorbiae euphorbiae L.* ♀). This hybid very closely resembles the inverse cross, hybr. *harmuthi*, but inclines more towards *elpenor.* That is especially noticeable in the position of the oblique band, which is less close to the base at the hind margin and therefore appears more straight. The atavistic line which runs from the apex to hind margin is almost exactly parallel with the oblique band, the outer costal spot is no longer distinct in the dark border of the costal margin. — The larva is very variable, being mostly dark blackish brown, with smaller or larger yellow subdorsal spots. A slight red dorsal line is usually present, as well as the small yellow pencilling derived from *euphorbiae.* The horn is feebly curved. The colour of the venter is usually paler than the ground-colour. — Obtained in captivity, but apparently also occurs in nature.

elpogallii. **P.** hybr. **elpogallii** *Castek* (*Pergesa elpenor elpenor L.* ♂ × *Celerio gallii gallii Rott.* ♀). According to the original description this hybrid resembles *elpenor* in markings and *gallii* in colouring. The red colour of *elpenor* is represented only by a very slight suffusion. The oblique band projects very far basad, so that only a narrow space remains between it and the atavistic line which runs from the apex nearly parallel with the proximal edge of the band. The hindwing has a broad black submarginal band, the marginal area being very narrow. The transverse band is uniformly reddish, but pale at the anal angle. Markings of underside as in *elpenor*, but the colour more yellowish. — Larva varying from light grey through olive-green to black. Thoracical segments but little swollen, subdorsal spots pale yellow, irregular in shape, best developed on the anterior segments, but sometimes partly or even entirely absent. Horn larger than in *elpenor*, usually red with black tip. — So far only obtained in captivity.

gillyi. **P.** hybr. **gillyi** *Kysela* (43 c) (*Pergesa elpenor elpenor L.* ♂ × *Celerio vespertilio Esp.* ♀). According to the description given by the author the ground-colour of the forewing is greyish olive-green; the oblique band, which is somewhat darker, resembles that of *elpenor* and is bordered with dark greyish olive. The costal margin grey-green as far as the small dark smear (presumably homologous to the outer costal spot) situated et $^{3}/_{4}$, then reddish grey to the apex. The white discocellular dot of *elpenor* is here grey or absent. The two red stripes of *elpenor* (presumably the median projection of the basal area and the space between the oblique band and the atavistic line running parallel with its inner edge) are here greyish violet, the marginal area is lilac grey, being violet towards the fringe. The hindwing is dark rose-red with a tinge of lilac. The basal patch black as in *elpenor*, the marginal band dark grey and rather far from the margin terminating before reaching the light rose-red anal spot. The antennae are red beneath, whitish above. The red stripe between the patagia characteristic of *elpenor* is but feebly marked. The red dorsal line absent or vestigial and diffuse. One pair of black side-spots is present. — The larva is said to differ but slightly from that of *elpenor*; the moons in the ocelli are described as being orange-yellow instead of whitish grey, and the head, anal tergite and claspers as reddish. The horn is straight and very short. — Only obtained in captivity.

irene. **P.** hybr. **irene** *Denso* (*Pergesa elpenor elpenor L.* ♂ × *Celerio hippophaës hippophaës Esp.* ♀). Costal margin broadly olive-green, lilac pink at apex. The atavistic line running from the apex to the hind margin almost parallel with the proximal edge of the oblique band olive-green and distinct. The black discocellular dot always present. The olive-green oblique band is apically incurved, a character derived from *hippophaës*, and extends nearer to the base at the hind margin than in *pernoldi*. Basal, central and marginal areas lilac pink. The hindwing has a broad black basal area, upon which follows the bright red median band, whose anal portion has a slight pink tone. The submarginal band is very diffuse, blackish olive-green, united at the costal margin with the basal patch and posteriorly gradually fades away. The underside of the wings is red, the forewing bearing a black basal smear, and the two parallel lines derived from *elpenor* are indistinct. — The full-grown larva is green or black-brown, with paler subdorsal line, distinct yellowish green subdorsal spots on the segment which bears the horn, and feebly marked small ring-spots on the thoracical segments in the place where the ocelli of the *elpenor*-larva are found. The thoracical segments are slightly swollen, but much less so than in *elpenor*. — Only obtained in captivity.

luciani. **P.** hybr. **luciani** *Denso* (43 c) (*Pergesa elpenor elpenor L.* ♂ × *Pergesa porcellus L.* ♀). Costal margin olive-green variegated with red, apically red. The atavistic line running from the apex to the hind margin almost parallel with the inner edge of the oblique band, and the middle costal spot dark olive-green. Marginal band olive-green, its apex distinctly curved towards the costal margin. Basal, central and marginal areas dull pink. Hindwing with a broad black basal patch and very broad reddish grey marginal band, between which there is only a narrow yellowish red transverse band. Abdomen with one pair of greyish black lateral spots. — The full-fed larva greyish brown, with light ocelli. Horn short. — Found in nature and also obtained in captivity.

standfussi. **P.** hybr. **standfussi** *Bartel* (43 c) (*Pergesa porcellus L.* ♂ × *Pergesa elpenor elpenor L.* ♀). On the whole more brightly coloured than hybr. *luciani*; the oblique band very rarely curving towards costa and then very indistinctly. The atavistic line from apex to hind margin reaches the latter nearer the base. Hindwing more deep pink, marginal band much less developed than in *luciani*. The underside of the wings is red, with broad black basal area on the forewing. Scheme of markings more resembling that of *porcellus*. Abdomen without side-spots. — Larva darker than that of *luciani*. The ocelli with dull diffuse pupil. — Found in nature and also obtained in captivity.

C. Secondary Hybrids.

pernoldiana. **C.** hybr. sec. ord. **pernoldiana** *Aust.* (*Celerio* hybr. *epilobii Bdv.* ♂ × *Celerio euphorbiae euphorbiae L.* ♀). Resembles *euphorbiae* so closely that a specimen found in nature would hardly be recognised as a hybrid; but the caterpillar might perhaps reveal itself as a cross on account of its characteristics. The costal margin is usually somewhat darker than in *euphorbiae*, the outer costal spot is only slightly indicated or absent. The atavistic line running from the apex to the middle of the hind margin appears to be rarely marked, while the line which runs to the hind angle parallel with the distal margin is frequently visible. The olive-green colour of the markings is somewhat duller than in *euphorbiae*, but the ground-colour of the same tone as in that species. The hindwing also does not offer any noteworthy distinction. The underside is uniformly pale red, much lighter in tone than in *euphorbiae*, and bears scarcely any traces of markings. — Only obtained in captivity.

eugeni. **C.** hybr. sec. ord. **eugeni** *Mory* (*Celerio* hybr. *epilobii Bsd.* ♂ × *Celerio vespertilio Esp.* ♀). This hybrid occurs in 3 forms according to Mory, which represent intermediate stages between *vespertilio* and hybr. *epilobii*. The description of the principal form is as follows: Forewing light grey, laterally of the oblique band darker grey, the band as in hybr. *epilobii*. A narrow dark grey costal border. Basal and central costal spots dark grey, outer one absent. Hindwing: the red colour of the oblique band as in *vespertilio*, spot at anal angle very pale, almost white, marginal band distant from margin. The underside of the wings is a lighter or darker reddish tone, with the base of the forewing grey. At the cross-vein a dark grey spot, which corresponds to the middle costal spot of the upperside. A second form, of which only one specimen was obtained, has all the grey colour of the principal form replaced by olive-green. The third form has the forewing uniformly grey, being very similar to *vespertilio,* but the forewing is darker grey. — There occur among the main form of hybr. *eugeni* also specimens *rubescens.* suffused with red, which we unite here as f. **rubescens** *f. n.* — The larvae are extraordinarily variable; they were found at Hueningen on Epilobium dodonaei Villars (= rosmarinifolium Hochst.) and stand on the whole in between the caterpillars of hybr. *epilobii* and *vespertilio.* The horn is very small or absent. — Only obtained in nature.

burkhardti. C. hybr. tert. ord. **burkhardti** *Mory* (*Celerio* hybr. sec. ord. *eugeni Mory* ♂ × *Celerio vespertilio Esp.* ♀). Exceedingly close to *vespertilio,* only distinguished from it by the atavistic line which runs from the apex to the hind margin parallel with the inner edge of the oblique band, as well as the central and outer costal spots being distinct. Moreover the base of the forewing is paler grey, and the distal dentate border of the oblique band contrasts distinctly with the paler marginal area. The black submarginal band of the hindwing is farther away from the margin. The underside of the wings as in *vespertilio.* — The larvae, which were found on Epilobium dodonaei Villars (= rosmarinifolium Hochst.), closely resemble those of *vespertilio* according to Mory, but recall *euphorbiae* in some characters. They have no horn, but bear a small tubercle instead. — Only found in nature.

johni. C. hybr. **johni** *Denso* (*Celerio f. wagneri Denso* ♂ × *Celerio gallii gallii Rott.* ♀). This hybrid is remarkably different from the very closely related hybr. *kindervateri.* First of all, the moths are on the whole much paler above as well as beneath. The light olive-green costal border is narrower, and the central and outer costal spots are distinct; the apex of the costal margin is light lilac grey. The central area is broader than in *kindervateri* and much lighter yellowish brown. The oblique band extends more basad at the hind margin and is very irregularly dentate or undulate at both the inner and outer edges. Especially noteworthy is a yellowish brown light cloud appearing in most specimens in the lower portion of the band. The distal margin is lilac grey like the apex of the forewing (almost the same colour as in *livornica*). The hindwing, too, is very different from that of *kindervateri.* The red colour is much paler, usually shading into yellowish pink at the costal margin, and is usually variegated with olive-green distally along the submarginal band. The white anal spot is brilliant white and almost exactly circular. The black submarginal band is very irregular in shape, usually small black streaks or spots project from it into the red band. The marginal area is yellowish pink, and the veins are thinly black within it in all the known (10) specimens. The abdomen has usually only a feeble dorsal line, and the white segmental incisions are less prominent than in *kindervateri.* The underside is generally yellowish, rarely bearing a pink flush. — Larva very similar to that of *galiphorbiae,* but the second subdorsal row of spots is usually absent or but slightly indicated. There are now and again feeble traces of the subdorsal line.

jullieni. C. hybr. (sec. tert. ord. ?) **jullieni** *Denso.* This highly interesting moth is presumably the product of a cross between *gallii* and *vespertilio.* It differs but little from *vespertilio.* The ground-colour is more black-brown, the proximal edge of the oblique band is very distinctly marked, likewise the middle costal spot. The transverse band of the hindwing is pale pink inclining a little towards yellow, the anal spot circular, paler. The submarginal band blackish grey, diffuse, farther away from the margin than in *vespertilio*; marginal area dull pink. Underside as in *vespertilio.* The abdomen bears only two pairs of black side-spots, the usually white-coloured hair on the sides is here yellowish. Pulvillus distinct. — The larva, which was found in the Valais in the same place as larvae of *vespertilio,* was black with many small red dots, bright red subdorsal spots, no dorsal line, and a very short horn, which was half black half red.

walkingi. C. hybr. **walkingi** *Turati* (*C. f.* (hybr.) *giesekingi Turati* ♂ × *C. f.* (hybr.) *walteri Turati* ♀). Costal margin of forewing darker than in *euphorbiae,* some of the veins pale in the oblique band. The atavistic line in the marginal area of the forewing usually distinct. Underside of wings red. Thorax without white border to the patagia. Dorsal line sometimes indicated. The third pair of the black and white abdominal spots always present, but sometimes very weak.

grossei. C. hybr. **grossei** *Denso* (*C.* hybr. *galiphorbiae Denso* ♂ × *C. euphorbiae euphorbiae L.* ♀). Strongly recalls *euphorbiae,* but the costal border to the forewing is darker, the costal spots resemble the scheme of markings of *gallii.* On the hindwing the red band is slightly paler at the anal margin. Antennae partly pure white, partly light olive.

helenae. C. hybr. **helenae** *Grosse* (*C.* hybr. *galiphorbiae Denso* ♂ × *C. gallii gallii Rott.* ♀). Differs from *gallii,* which it closely resembles, in the shape of the oblique band, which extends much less basad, and in the broader marginal area of the hindwing. Antennae of ♂♂ greyish olive with white apex, those of ♀♀ pure white.

kindergallii. C. hybr. **kindergallii** *Grosse* (*C.* hybr. *kindervateri Kysela* ♂ × *C. gallii gallii Rott.* ♀). Forewing very much like that of *gallii* in marking and colouring; hindwing more similar to that of *euphorbiae.*

hippoides. C. hybr. **hippoides** *Denso* (*C. hippophaës hippophaës Esp.* ♂ × *C.* hybr. *hippophorbiae Denso* ♀). Similar to a very pale *hippophaës,* but the basal costal spot of the forewing is not produced into a pointed projection; moreover, the middle costal spot, which is a mere smear in *hippophaës,* is more strongly developed.

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16. Family: Uraniidae.

Under the name of *Uraniidae* a number of very heterogeneous moths are united which, for more than one reason, must be considered as being some of the strangest of Lepidoptera. One group contains the most brilliant species of all the Lepidoptera of the globe; magnificent majestic forms with golden or bronze or brass gloss and the hindwing bearing long and delicate tails. The tired traveller crossing the hot Llanos of South America and entering the dense shade of the valleys of the mountains, where foaming brooks have gnawed a bed into the rocks, is enchanted by the crowds of marvellous *Urania* which rest on foam-bespattered walls of rock with the wings spread out flat so that the metallic ornamentation of the wings glimmers in the sunshine. They resemble the Swallowtails not only in facies, but also in their mode of flight, and their habits, and their beauty, craving thirst and preference for day-light renders them superficially so similar to the Papilios that the Uranias might be regarded as the representatives of that family among the Moths.

As a matter of course, all the similarities between Papilio and the genera *Urania* and *Chrysiridia* are only the result of convergent development and have nothing whatever to do with so-called "Mimicry". For that reason it is not possible to select a Papilio to which e. g. *Urania leilus* or *fulgens* bears a more special resemblance. Mimetic similarity occurs, however, in one instance in the genus *Alcidis*; but in this case the Uranid is the model which is imitated by a Swallowtail, *P. laglaizei* or *alcidinus* (cf. vol. 9, pl. 38 c). There is indeed no necessity whatever for mimetic modification in the glossy golden Uranids. A moment's observation of their habits convinces one at once that these moths are almost absolutely protected against insectivorous birds, whatever it may be that renders them immune; observe e. g. the East African *Chrys. croesus* when it flies in the morning sun around the flowering Magnolia-trees entirely unmolested and challenging attack as it were, or the species of *Urania* which flutter about before the eyes of the Tyrannid-birds which are seen waiting for prey on every bush, or settle on the fissured rock of the mountain-valleys over which the water drizzles.

This group of glorious moths, however, is not represented in the Palearctic Region. The dark coloured genus *Nyctalemon* approaches Palearctic territory with one species, *N. patroclus*; it is still rather abundant at Silhet in the Himalayas, but does not appear to reach Kashmir in the North-West, as far as that country belongs to the Palearctic Region. In farther India the species is very abundant in places, but already in Southern China, at Hongkong, it was obtained by me surprisingly rarely, and does not appear to go much north of that place. I did not meet with it at Shanghai, and it does not apparently reach Palearctic territory in Western China, although one might expect stray specimens of such an excellent flier and wanderer to occur in the Yang-tse valley.

A further group, entirely dissimilar to the above forms, are the *Microniinae*, rather small and dull white moth of a pronounced Geometrid facies. They strongly recall *Ourapteryx*, have pointed forewings like these and their hindwings have often a short tail, this tooth frequently bearing the same peculiar markings which are found on the wing-projection of *Ourapteryx*. Only of this group representatives are found on Palearctic territory, namely 3 forms, which evidently are acquisitions from the neighbouring Indian countries. But as they extend to Amurland or the interior of China it is necessary to describe them here.

The third and last group, which has only very distant affinities with the previous groups, especially with the first, and might better be treated as a separate family, has likewise the facies of Geometers, the species being formerly considered to belong to the Loopers. The larvae with their 16 feet, and some minute differences in structure in the moths were the reasons for separating them from the Geometers and placing them into the present family, already very heterogeneous without them. They are mostly small species, but some genera contain also larger forms. The entire group has received the name of *Epipleminae*, the name being derived from the principal genus, which contains almost exclusively very small forms. During the last decade a very large number of species of *Epiplema* have been described as new.

As the first subfamily (*Uraniinae*) is not represented in the Palearctic Region, we commence with the second:

b. Subfamily: **Microniinae.**

1. Genus: **Acropteris** *Hbn.*

Small, very slender and delicate moths with the frons relatively broad, the antennae filiform, the palpi short and upturned, the legs long and strong, the tibial spurs long, and the abdomen slender, not projecting beyond the hindwing. Forewing with the apex somewhat produced, the costal margin strongly curved and the anal angle sharply marked and almost rectangular; the margin of the hindwing slightly and very obtusely elbowed at the upper median vein. The colour is silky white, the wings above with thin golden-brown longitudinal, oblique or transverse lines, the underside usually without stripes, shaded with grey. The moths rest by day in thickets; they are usually very abundant, only being rarer at the boundary of their area of distribution.

iphiata. **A. iphiata** *Guen.* (= pontiata *Guen.*, convexaria *Walk.*) (22 f). From the strongly pointed golden brown apex of the form a white oblique band runs to the centre of the hind margin, gradually widening and being continued over the hindwing, where it becomes broken up and dull in consequence of an admixture of grey. Similar but narrower bands run parallel with it on the hindwing and are found on the forewing at costal and distal margins. — From Amurland and Japan, distributed southward throughout Eastern and large tracts of Southern Asia, being very come in some places in India; rarer and often local in the Palearctic Region. The moths rest in the brush-woods on the underside of leaves, holding the wings spread out as do Geometers, and are flushed by beating bushes at the road-sides and pendant branches of trees. This species is remarkably similar to certain *Geometridae* and *Leucodrepana idaeoides* (cf. pl. 48 a), from which it is not distinguishable on the wing.

thibetaria. **A. thibetaria** *Pouj.* (48 f). This form, described by the author as a *Micronia*, comes close to the previous, but the stripes running from the apex and across the disc are only represented by thin brownish grey lines which correspond to the edges of the stripes. — Described from 2 ♂♂ from Mupin (Chinese Province of Sze-chuen); the author does not state that the species really occurs in Tibet, but he apparently considers Mupin to be a place in Tibet. — I have not seen the species.

2. Genus: **Micronia** *Guen.*

This genus, so charateristic of all the Indian forest districts, is only represented in our territory by one species, which is found at the southern boundary. The species extends to our Region only on the Continent; although still common on Formosa, it does not extend to the main islands of Japan. The statements as to the number of species in this genus are very different according to whether one considers all the insular forms of the South-Asiatic Archipelago as one single species, or as numerous separate species. The genus is characterised by the palpi being thin, rather long and porrect, the frons flat, the antennae flattened and in the centre slightly incrassate, the legs long and delicate, with the hind femora slightly thickened. Hind tibia with pairs of mid- and end-spurs. Wings large, delicate, the forewing pointed with the distal margin quite straight, veins 2 and 3 on a very short stalk, 6 and 7 from angle of cell, 8, 9 and 10 stalked. Hindwing angulate at vein 4 (upper median): the distal margin almost quite straight from this angle to the pointed apex on the one side and to the anal angle on the other. The moths repose on the underside of leaves holding the wings spread out like Geometers.

aculeata. **M. aculeata** *Guen.* (= gannata *Guen.*, sondaicata *Guen.*) (48 f). This typical species of the genus is milky white, the wings being minutely pencilled with golden brown; from the costal margin of the forewing to the abdominal margin of the hindwing run 3 parallel grey shadowy stripes; in front of the tail of the hindwing a black spot, near which there are some black dots at the distal margin. Underside plumbeous grey in ♂, white in ♀, without markings. — In India, on the Sunda Islands, throughout Southern China, on Hainan, Formosa, etc., very common; it is hardly possible to walk through brush-wood late in the season (July to November) without flushing some specimens. — Indian examples have the wings rather longer and more pointed than my Chinese ones; the latter, moreover, are very minutely pencilled.

3. Genus: **Pseudomicronia** *Moore.*

The species of this genus come very close to *Micronia* and have the same Geometrid facies, strongly recalling *Ourapteryx*, from which they are at once distinguished by the larvae having 16 feet. The colour of the few forms which belong here is white with dull grey or light bronze-brown transverse stripes across both wings; the wings are exceedingly delicate.

Head small, frons broad. Eyes small, black. Palpi short but strong, porrect. Antennae flattened, not visibly incrassate at the apex. Body delicate. Mid tibia with 1 pair, hind tibia with 2 pairs of spurs. Abdomen very short, in ♀ hardly reaching the middle of the abdominal margin of the hindwing. Wings shaped almost as in *Strophidia*, particularly in the Indian species, whereas the tooth of the hindwing is shorter in the Palearctic species. The genus differs from the very similar *Micronia* in the lower and middle median veins of the forewing coming from a point in the ♂ and separating at once, while they are stalked, though rather shortly, in *Micronia*. The moths are usually abundant; they rest in daytime on the underside of the leaves of young trees; they easily fly away, but settle again exactly like most *Geometridae* at a distance of 10—20 metres in a similar place, and are therefore easily caught.

archilis. **P. archilis** *Oberth.* (= soror *Alph.*) (48 f). White, the wings in the costal area with numerous transverse stripes, of which many extend to the hind margin. The transverse stripes of the hindwing particularly distinct in the basal and distal-marginal areas; in the central area 1 or 2 grey arcuate shadows. Easily distinguished from the very similar Indian *P. coelata Moore*, which is the same in size, and the Ceylonese *fraterna* by the much shorter and less strongly spotted tooth of the hindwing. The figure given by Oberthür, which has the groundcolour pinkish grey, is apparently quite erroneous, for it does not agree with the description, in which the upperside is called "white" and the underside "entirely white". Occurs in Sze-chuen and extends northward to Kansu, where it has been found in September. Oberthür gives Tibet as patria, but adds "Ta-tsien-lu", which is not situated in Tibet but in Western China, being separated from the very distant Tibetan frontier by the Sün-ling.

c. Subfamily: **Epipleminae.**

4. Genus: **Nossa** *Kirby.*

Rather large white moths, somewhat resembling in facies large *Abraxas* or *Nyctemeridae*. Head broad, but short and depressed; frons very broad. Eyes small. Palpi short. Proboscis present. Antennae very short, bipectinate. In the ♂ the apex of the forewing a little produced, that of the hindwing very strongly so, projecting far beyond the hind angle of the forewing. About half a dozen forms are known, which are all more or less white and black. They are distributed over India and China to Amurland, but are absent from Japan.

nelcinna. **N. nelcinna** *Moore* (= nelcynna *Leech*) (48 e). White, rather thinly scaled; dull black submarginal and discal bands across both wings. Head and thorax black, the latter sometimes with red or yellow collar, the abdomen orange. From Kashmir. — *chinensis.* **chinensis** *Leech* has the dark scaling much more strongly developed; and the hindwing of the ♂ has a yellow tone; the bright collar is absent. West China, where, however, transitions to *nelcinna* also appear to occur, as Elwes states that he cannot find a difference between the two forms, while Alphéraky regards the difference as considerable. In July. — *leechi.* **leechi** *Elwes* is a form with the wings so much darkened that the insect is rendered superficially similar to the Pierid *Delias patrua* (cf. vol. I, pl. 19 e) or *subnubila* (ibidem), which fly in the same locality. As this melanotic colouring — which is the result of the increase of the black markings and corresponding reduction of the light ground-colour to slight traces of it — appears to be constant according to Leech, we are perhaps dealing with a distinct species.

palaearctica. **N. palaearctica** *Stgr.* (= nelcynna *Stgr.*) (48 e). Similar to the previous species, but much more extended white, the dark scaling being for the greater part restricted to a marginal lunate line and a discal chain of spots, which latter is sometimes obsolescent on the hindwing. — Amurland; found in June, flying in the sunshine like a butterfly (Graeser); an imitation of *Metaporia largeteaui*, with which it flies together; apparently rare.

5. Genus: **Oberthueria** *Leech.*

These magnificent moths, the first of which was discovered by the Abbé David and described by Oberthür (but as a Geometer!), connect to a certain extent the genera *Nossa* and *Psychostrophia*, and presumably fly by day like these two genera. The facies of the moths is hardly Geometrid, only the broad white wings recalling *Abraxas*; but vein 5 of the hindwing is distinct, only appearing weaker because it is not so black as the other veins, especially the median and submedian veins.

Head small; frons narrow and depressed. Eyes as in *Psychostrophia* relatively large. Palpi short, porrect, hairy. Antennae rather thick, with thin and very short fascicles of cilia. Thorax almost circular. Abdomen slender, not reaching anal angle of hindwing. Wings very broad, the widening commencing soon beyond the base so that the cell is enormously dilated and the radials originate far apart; veins 6 and 7, as well as 8 and 9 stalked. Hindwing with 2 veins in cell, vein 5 exactly from the middle of the discocellular. Colouring of the wings white with bright margins. Nothing is known of the habits. — Type *O. davidi.*

davidi. **O. davidi** *Oberth.* (48 e). Body yellow, with blackish grey markings, abdomen with dark belts. Wings snowy white, with thin deep black veins. Costal margin of forewing orange-yellow, irregularly spotted with black, distal margin broadly black with orange-yellow bands in the black border. — The moth is still rare in collections, but is presumably very abundant in its native country, West China and East Tibet.

erebina. **O. erebina** *Oberth.* (48 e). Described from a ♂ from Ta-tsien-lu. Almost like the previous, but the orange colour restricted to the basal area of the forewing, being almost completely absent from the costal and distal marginal area.

flavomarginaria. **O. flavomarginaria** *Leech* (48 e), in contradistinction to *erebina*, has the orange bands in the black wing-border so strongly developed that they extend without interruption from the costa to the hind margin, even enclosing a chain of black spots. — Wa-shan in West-China.

nigromacularia. **O. nigromacularia** *Leech* (48 f). Size and facies of a medium sized *Abraxas*; both wings white, with small spots at the costal margin, larger ones at the distal margin, and very large ones on the disc, all dark; thorax and costal area of forewing with an orange-yellow tint. — Chang-Yang in Central-China. The moth somewhat resembles in colour and markings the East Asiatic *Abraxas placida Butl.*

6. Genus: **Psychostrophia** *Butl.*

This small genus is restricted to East Asia. It contains moderately small bright-coloured species, which have sometimes been placed with the *Geometridae*, sometimes with the *Arctiidae*. The Palearctic species have a striking character in common in the fringes of all the wings bearing pale patches.

nymphidiaria. **P. nymphidiaria** *Oberth.* (48 f). The basal two-thirds of both wings white, the distal third black with an interrupted chain of white spots; costal margin of forewing broadly black with a triangular tooth at the apex of cell. — Sze-chuen, West-China. Does not appear to be abundant. According to Oberthür, who described it as an *Abraxas*, the species is an imitation of the butterfly *Stiboges nymphidium* (cf. Macrolepidoptera of the World vol. I, pl. 89 d, and vol IX, pl. 139 b).

picaria. **P. picaria** *Leech* (48 f). Like *nymphidiaria* black and white, but the forewing with the hind part black to the submedian vein. The white disc of the hindwing is traversed by an oblique black band from the costa to the centre of the hind margin. In the ♀ the white colouring rather more extended than in the ♂. — From Central China: Chang-Yang and I-chang.

melanargia. **P. melanargia** *Butl.* (48 f). Black, a triangular basal spot, an oblique discal band and 3 spots in the distal-marginal area of the forewing straw-yellow; moreover, the hindwing yellow with the exception of a costal *hemimelaena.* stripe and an elbowed spotted marginal band. In ab. **hemimelaena** *ab. nov.* (48 h), which occurs among ordinary specimens, but is rarer, the yellow colour is so much reduced that the greater part of the hindwing is black, the yellow being restricted to a transverse halfband and 3 isolated small anal spots. There occur intermediates between these two forms, which I caught in the same district. The submarginal spots of the forewing are not rarely joined together by yellow lines, or are confluent, which gives the insect a very variegated appearance; *catenifer.* this form I call ab. **catenifer** *ab. nov.* — The species is extraordinarily variable; among a number of specimens caught by me in the same places at Hiogo and Yokohama hardly two are alike. I did not discover the larva inspite of diligent search, probably because at that time I thought the larva to be a looper. The moth is abundant late in the summer, even in the gardens of the towns, on field-paths and mountain-slopes. It flies by day and superficially resembles on the wing certain forms of *Parasemia plantaginis* (cf. pl. 16 f), but its flight is much slower.

7. Genus: **Epiplema** *H.-Schäff.*

This genus, better known under the name of *Erosia*, contains a large number of highly peculiar small moths and is distributed over all the continents with the only exception of Europe.

Head small. Eyes large. Proboscis present. Palpi of medium length, obliquely upturned. Thorax strong. Abdomen not reaching the anal angle of hindwing. The wings sometimes with peculiar lobes; there is nearly always a tooth at the apex of the upper median vein of the hindwing and a second below the apex, the margin being sinuous between them. In the forewing vein 5 originates from upper cell-angle, 6 and 7 are stalked together, likewise 8 and 9. At rest the fore- and hindwings are held separated, the former being sometimes curiously folded and extended. Otherwise the habits resemble those of small Geometers, e. g. *Acidalia*; like these the *Epiplema* rest on tree-trunks or smooth walls, fly at night, and in daytime when flushed only take to the wing for short distances. — The larvae are stout, with sparse hair; 16 feet. — Most species are not rare where they occur. As a large proportion of the species which touch Palearctic territory is Indian, some of the species here mentioned will be figured in the Indian volume (vol. X) of this work.

himala. **E. himala** *Butl.* White; forewing with 3 transverse line which converge at the hind-margin; hindwing with orange-yellow smear and black spot in the centre of the distal margin. True *himala* occurs in the Himalayas; whether it is also found on Palearctic territory is not known to me. — But in the Palearctic district of Inner China, in Sze-chuen, occur smaller and paler specimens in which the spot of the hindwing is lighter yellow and *evanescens.* smaller, the transverse lines of the forewing being obsolescent or quite absent; this is **evanescens** *Alph.* (= auroguttata *Pouj.*) (48 i). At the Honton River and the Fu-hian-ho, in August; also at Mupin in Sze-chuen.

exornata. **E. exornata** *Ev.* (= exornataria *H.-Schäff.*, rapha *Butl.*) (48 i). White, in the distal area variegated with brown and bearing dark markings; distantly resembles *Acidalia decorata Borkh.* in size and facies. In East *bicaudata.* Asia, from Kiachta to Amurland and Japan. In June and July. — The form from Kashmir, **bicaudata** *Moore*, has the markings in the outer area somewhat narrower; this form is also known from Ningpo and I-chang.

nubifasciaria. **E. nubifasciaria** *Butl.* Similar to the previous species; creamy white, the basal half with a dull blackish tone. Forewing beyond centre with a brown band with blackish edges, distally to the band a large irregular blackish grey cloud occupying the whole marginal area with the exception of the apex and bearing at its outer edge a slightly curved black transverse spot. Hindwing with blackish markings in the basal area, median band and dark cloud as on the forewing; discal dot black, elongate. — Described from a single ♂ from Chang-Yang, obtained in August.

erasaria. **E. erasaria** *Christ.* (48 k). The forewing of this species is light coloured and almost without markings, only the area near the hind angle and a place near the larger sinus of the distal margin situated below the apex *schidacina.*

are variegated with dark scaling. Cannot be confounded with any other species on account of the characteristic markings and wing-shape. Amurland; in July. — **schidacina** *Butl.* (48i). Silvery grey above with the costa of the forewing irrorated with dark specks; on the disc of the forewing a sickle-shaped line which posteriorly traverses a black patch which contains two plumbeous spots; distal margin narrowly golden brown, edge itself black with a silver-line, before the edge a row of black dots. Hindwing golden brown, minutely pencilled, most densely so in a subbasal transverse band which does not cross the lower part of the cell; on the disc a tricolorous band (black, yellowish brown and brown), upon which follows a plumbeous one which is dilated below the third median vein. Underside pale brown, with dark irroration. China, Japan (main island and Hokkaido).

instabilata.

E. instabilata *Walk.* (= insolita *Walk.*, conchiferata *Moore*). This species has an enormously wide distribution, but is essentially Indian, and therefore the figure will be given in the Indian volume X. Thorax and base of abdomen white, head, collar and rest of abdomen brown. Forewing brown, marked with black and pencilled, the hind marginal area whitish with dull brown markings; at the lower angle of cell a white spot; before the distal margin some small black spots. On the hindwing, on the contrary, the costal area is white, while the anal half is brown with black markings. — Distributed from China over large tracts of Anterior and Farther India to Ceylon, the Sula Islands, Flores and the Solomons. Abundant.

plagifera.

E. plagifera *Butl.* (48i). White, basal part of costal area shaded with grey; in the centre of the wing a dark transverse band, which is edged and pencilled with black which is interrupted by the median branches. At cell-apex a large round black spot which bears at its outer side near the costa a small rust spot; before the distal margin a grey transverse spot, bearing distally 4 small round black spots of unequal size: margin with blackish spots. The hindwing is traversed by angulate tricolorous bands, the colours being in basidistal order black, white, brownish yellow; near the base 2 small black spots, 2 larger ones close beyond the apex of cell; below the cell a plumbeous streak from base to distal margin, widening distally; marginal line brownish, proximally edged with black between the small tails. Underside of hindwing brownish, with black central spot and black-spotted margin. — One of the smaller species. China and Japan (Yokohama).

illotata.

E. illotata *Christ.* Near *erasaria*, similar in colour, but smaller, only measuring 17 mm, and the wings not so strongly excised. — Amurland, found together with *erosaria* in July.

moza.

E. moza *Butl.* (48 i). Light brown; darker markings at the outer margin below the apex, at the hind margin near the outer angle, at the costa between central and marginal areas of forewing. On the hindwing dentate lunate lines traverse the disc. — Japan, on the main island and Kiushiu. The specimen figured is exceptionally pale.

monataria.

E. monataria *Leech.* Similar to *moza*, colouring and markings almost the same, but the angle in the middle of the distal margin of the forewing more pointed and at hind angle a distinct lobe; the two points at the distal margin of the hindwing longer and broader. — Mupin in West China, in July.

cretacea.

E. cretacea *Butl.* (48i). Chalky white, with a silky gloss; across both wings a brownish, angulate transverse band bordered diffusely on both sides with blackish scaling and being externally prominent only at the costa. Beyond this transverse band a brownish stripe, which is especially distinct on the hindwing; base of forewing shaded with brown, near the base a small dark angulate band, before the distal margin irregular small dark spots. Hindwing with dark transverse band in the basal area and two small spots at the apex of cell; a dark marginal line between the tails and a dull small ocellus above the lower tail. Underside dirty brown. — Japan, main island and Kiushiu.

styx.

E. styx *Butl.* (48i). Dull sooty brown. Forewing with pale postmedian band which is distally bounded by a velvety black dentate band; beyond the latter a plumbeous band; basal and distal marginal areas sparsely irrorated with grey; centre of costa spotted with white; disc of forewing traversed by a row of black dots: marginal line pale. On the hindwing a pale angulate band which is edged with black and plumbeous; only the lower tail is well-developed, above it a dark spot. Underside with silky gloss, sooty black; the hindwing sometimes pale in the basal area. — Japan, on the main island and Hokkaido.

azela.

E. azela *Butl.* (48i). This species is similar in colouring to a small *Cidaria*. Both wings proximally dark, distal marginal area whitish; pale-coloured along hind margin of forewing and at base of hindwing. — Japan.

columbaris.

E. columbaris *Butl.* (48i). Uniformly greyish brown, in shape resembling certain *Macaria*. Both wings slightly incurved below the apex, proximally and distally to middle traversed by minute dark atoms arranged in arcuate rows. — Kashmir.

ruptaria.

E. ruptaria *Moore.* White; before and beyond the centre indistinct ochreous bands; spots are placed at the base of the costa, towards the apex and one at the hind angle; between veins 4 and 5 a dark submarginal spot; below the apex ochreous pencilling, which occasionally merges together to form a spot. Hindwing with indistinct yellow bands. — Kashmir; extending eastward to Calcutta.

mabillaria. **E. mabillaria** *Pouj.* (48 i). From Mupin, 26 mm. Wings long, white; forewing with obtuse, rounded, angle in the centre of the distal margin; hindwing not distinctly dentate at the margin, excepting the median vein, which bears a small pointed tail. On the hindwing an irregularly undulate pale line; the subbasal line indicated by dots, of which one is placed on the costa, a second in the centre, a third on the median vein and the last on the submedian vein. Body white. Antennae with short pectinations. — This species stands here certainly in the wrong place and will again be referred to in its correct place among the Geometrid genus *Palaeomystis* in vol. 4. p. 12.

Alphabetical List

of the Palearctic forms of Uraniidae with reference to the original descriptions.

*) signifies that the form is figured in the place cited.

aculeata Micr. *Guen.* Phal. II, p. 26. *
archilis Pseudom. *Oberth.* Ét. d'Ent. 15, p. 24. *
azela Ep. *Butl.* Ann. Mag. Nat. Hist. (5) 1, p. 403.

bicaudata Ep. *Moore,* Proc. Zool. Soc. Lond. 1867, p. 643. *

catenifer Psych. *Seitz,* Macrolep. 2, p. 278.
chinensis Nossa, *Leech,* Entomologist, 23, p. 83.
columbaris Ep. *Butl.* Ill. Typ. Lep. Het. Br. Mus. 7, p. 82. *
cretacea Ep. *Butl.* Trans. Ent. Soc. Lond. 1881, p. 414.

davidi Oberth. *Oberth.* Ann. Soc. Ent. Fr. 1885, p. CCXXIX.

erasaria Ep. *Christ.* Bull. Mosc. 1880 (2), p. 70.
erebina Oberth. *Oberth.* Ét. Lép. Comp. 5 (1), p. 317. *
evanescens Ep. *Alph.* Rom. Mém. Lép. 9, p. 139.
exornata Ep. *Ev.* Bull. Mosc. 1837, p. 65.

flavomarginaria Oberth. *Leech,* Ann. Mag. Nat. Hist. (6) 19, p. 188. *

hemimelaena Psych. *Seitz,* Macrolep. 2, p, 278. *
himala Ep. *Butl.* Ann. Mag. N. H. (5) 6, p. 221.

illotata Ep. *Christ.* Bull. Mosc. 1880 (2), p. 69.

instabilata Ep. *Walk.* Cat. Lep. Het. Br. Mus. Suppl. 35, p. 1646.
iphiata Acropt. *Guen.* Phal. II, p. 29.

leechi Nossa *Elwes,* Proc. Zool. Soc. Lond. 1890, p. 381.

mabillaria Ep. *Pouj.* Ann. Soc. Ent. Fr. 64, p. 311. *
melanargia Psych. *Butl.* Ann. Mag. Nat. Hist. (4) 20, p. 401.
monataria Ep. *Leech,* Ann. Mag. Nat. Hist. (6) 19, p. 185.
moza Ep. *Butl.* Ann. Mag. Nat. Hist. (5) 1, p. 402.

nelcinna Nossa, *Moore,* Proc. Zool. Soc. Lond. 1874, p. 577. *
nigromacularia Oberth. *Leech,* Ann. Mag. Nat. Hist. (6) 19, p. 189. *
nubifasciaria Ep. *Butl.* Ann. Mag. Nat. Hist. (6) 19, p. 186.
nymphidiaria Psych. *Oberth.* Ét. d'Ent. 18, p. 34. *

palaearctica Nossa, *Stgr.* Rom. Mém. Lép. 3, p. 192. *
picaria Psych. *Leech,* Ann. Mag. Nat. Hist. (6), 19, p. 189. *
plagifera Ep. *Butl.* Trans. Ent. Soc. Lond. 1881, p. 414.

ruptaria Ep. *Moore,* Lep. Atkins. p. 259.

schidacina Ep. *Butl.* Trans. Ent. Soc. Lond. 1881, p. 415.
styx Ep. *Butl.* Trans. Ent. Soc. Lond. 1881, p. 416.

thibetaria Acropt. *Pouj.* Ann. Soc. Ent. Fr. 64, p. 311.*

17. Family: **Notodontidæ.**

The name of the moths which belong here is derived from the lobe-like hindmarginal prominence which is found in many species, and in the specimen at rest projects like a tooth above the back. The family, which contains some 700 species, occurs throughout the tropics and the temperate zones, and is even represented in some districts of the Arctic Region. The group is not remarkable for the size of the species; for even the largest Notodonts, which are found in South America, are far inferior in expanse to the giants among the *Sphingidae* (*Cocytius antaeus*), the Saturnids (*Attacus atlas*), the Noctuids (*Thysania agrippina*) and, of course, the largest butterflies, and even the largest *Cossidae* and *Hepialidae*.

The development of large forms is not a characteristic of the family, but the occurrence of strange ones. As regards the moths, adaption to the surroundings has often modified the insect to such an extent that the individuals are hardly recognisable as being insects. E. g., if two *Pterostoma palpina* rest in copula on a small piece of Poplar bark, only an eye specially accustomed to this phenomenon is able to distinguish the pair as such; and whoever collects in foreign countries species with which he is not yet familiar will sometimes be obliged to place the specimen into the hand in order to find out if he has to do with an insect or some dead object. The moth of *Phalera bucephala* at rest resembles so closely a piece of a broken off twig that one only perceives a specimen in its protective position if one already knows the species and bears its picture well impressed in one's memory.

But adaptation has even more strongly modified the larvae than the moths, the larvae being often provided with means of frightening an enemy. The facies of many species is so transformed as to conceal completely the fact that they are caterpillars, and in some genera all gradations in the transformation of the shape of the larvae can be observed. The caterpillar may be quite smooth (*Pterostoma*), or slightly humped on segment 11 (*Pheosia*), or bear here short points (*Lophopteryx*); there may be knobs on segment 5 (*Pygaera*) or lateral swellings (*Spatalia*) or a long process (*Notodonta*) or a divided appendage ((*Hoplitis*). The anal end may terminate in a soft fork (*Uropyia*) or two pointed tails (*Cerura*), or bear two long clubs (*Stauropus*) or a large hump (*Hoplitis*). The back of the larvae may be serrate (*Nerice*, *Stauropus*), humped (*Dicranura*) or provided with processes inclining forward (*Schizura*). Some species have a large head which has no special modifications and is rendered strange only by being held bent back in a peculiar way (*Phalera*, *Lophopteryx*), or by being retracted into a sort of hood; in others again the head is surrounded by a kind of bonnet, or some nuchal horn-like antlers project above it (*Heterocampa*). The anal tails sometimes are hardly indicated (*Heterocampa*), or feebly elevate (*Schizura*), or prolonged and mobile but directed downward at rest (*Exaereta*), or only strongly prolonged in the young larva (*Macrurocampa*), or are present in all stages and contain a reversible filament (*Dicranura*). These terrifying organs serve diverse purposes. The *Notodontidae* are not protected by inherent qualities, but are in all the stages a welcome prey to the enemies. For that reason are the moths so effectively concealed by their adaptive garb and try the larvae to frighten the enemy by their strange shapes, bluffing him by assuming peculiar attitudes in which the processes and humps become very prominent. There are all variations from the simple Sphinx-like attitude (*Lophopteryx*) to the pronounced agressive position of a *Dicranura* larva. Young caterpillars of *Datana perspicua* only slightly raise the head, older ones hold, like the *Phalera* larvae, the whole anterior portion of the body erect and also lift up the tail; larvae of *Notodonta* and *Hoplitis* assume a regular zigzag position, and those of *Stauropus* raise both ends and, moreover, threaten with their long legs. The threatening attitude is often supplemented by active defence. The larvae of *Hoplitis* bite resolutely and, as may be experienced when removing the eggs of Tachina by an operation, can impart a sharp pinch. Beneath the head of the *Dicranura*-larvae there is a transverse slit, similar to that of the caterpillars of *Cossus*, from which they squirt out for defense for a distance of more than 20 cm a liquid which occasions a burning sensation in the eyes.

Bright colours are of as little value for an unprotected insect as large size, and are therefore entirely absent from the Notodonts. According to their resting-place among leaves, on tree-trunks, halms, etc., the moths are green (*Rosema*), or of the brown colour of dead leaves (*Lophopteryx*), or — as is mostly the case — adapted to the tree-trunks (*Exaereta*, *Stauropus*, *Hoplitis*, etc.). The discovery of a freshly emerged *Cerura bicuspis* closely applied to the bark of a Birch is a master-task even for the eyes of the best-trained collector. Numerous species select the foot of trees as resting-place or sit in the grass, and resemble broken off bits of twigs or chips of wood, e. g. *Pterostoma*, *Phalera* and *Datana*. Among the caterpillars the green protective colouring of the twig or leaf on which they feed is much in evidence (*Pterostoma*, *Pheosia*), or they have the brown tint of the branchlet on which they rest (*Spatalia*). In certain species dichromatism occurs, some specimens being adapted to the green leaf and others of the same species or even same brood to the brown twig (*Pheosia tremula*). In other cases the colour can be changed at will for defensive purposes; the larva of *Dicranura vinula*, for instance, when molested not only shows the two well-known bright purple-red tail-filaments, but is also able when excited to intensify the red colouring around the head, and, when calming down, to weaken the red tint again so much that it does not interfere with the green protective colouring, a larva resting among leaves not being easy to find in spite of its odd shape.

The role which the Prominents play in a fauna differs, of course, to a certain extent in the various regions and countries, but is on the whole almost the same, everywhere, as compared with other families. An unusually large number of genera is distributed over several continents, and certain types of Notodontids are always met with and everywhere encountered almost daily. Whether one goes for a walk at Sydney in Southern Australia or at Rio de Janeiro, in Japan or in Ceylon, in Lapland or Morocco, in New York, Vienna or San Francisco, an examination of suitable shrubs will everywhere reveal without any difficulty puss-caterpillars which differ but little in facies from the larvae of our *Dicranura* and *Cerura*. A larva like that of our Bufftip (*Phalera*), i. e. a hairy black caterpillar with light-yellow reticulation and which rests on a twig with the fore and hind parts of the body raised, is found in Japan (*Phalera assimilis*) and Turkestan, in the Himalayas and on the Moluccas, in semitropical Florida (*Datana modesta*) and in wintery Canada (*Datana perspicua*), in the eternal spring of California and the sweltering heat of Morocco.

The Notodontids are pre-eminently tree-insects. Their resemblance to pieces of bark, small splinters of wood and broken-off tips of twigs already indicates that their food-plants must be looked for among the deciduous trees. I do not know of any Prominent which feeds on conifers, the genus *Thaumetopoea* being eliminated from the family; on the other hand, several genera (*Ceira*, *Anticyra*) are so well adapted to bamboo that there remains little doubt about their feeding on these Monocotyledons.

As regards the kind of landscape in which we may expect a large number of Notodonts, open country interrupted by rows or groups of trees is decidedly the most favoured. The edges of woods and broad roads crossing forests are known as suitable places for collecting Prominents, while the dark and damp interior of young forests is frequented only by very few species. The plains are more favoured than mountains, and in the entirely flat lowlands of eastern Europe and Northern Asia there occur not only numerous species, but many of them are found in great abundance of individuals. The Notodontids are on the whole common Lepidoptera; very few of them are actual rarities, and it is quite erroneous to consider as very rare in Nature the great number of Prominents which, like *Pyg. timon* and *Drym. vittata*, are rarely seen in collections. Experienced collectors have assured me that by cutting down likely young oaks in certain localities, on every bush without exception at least one larva of *Stauropus fagi* may be found, and that caterpillars as well as moths as a rule are beyond reach of eye and hand. At Hongkong I observed bushes entirely denuded of foliage by larvae of *Stauropus*, and the hungry caterpillars were seen running about far and wide in search of food. Dozens of cocoons of *Hoplitis milhauseri* can often be gathered in avenues of oak in the crevices of the bark if one has learnt to recognise the cocoon, which resembles a small hump of the bark itself. From experience at home I was accustomed to consider *Dicranura erminea* as not plentiful until I found the wooden cocoons in countless numbers one beside or on top of the other at the willows along a road near Shanghai, entirely fresh moths just emerged of *D. e. menciana* sitting on some of the cocoons. In 1904 the Poplars at Lambessa in Algeria were so much denuded by *Dicran. delavoiei* that not a single leaf remained and the trunks appeared dotted with green from the larvae which crawled about and covered the grass and ground for a considerable distance. The decimation by the Bufftip, *Phalera bucephala*, of the limes in the avenues of towns is a very familiar experience, and it is likewise well-known how quickly *Pygaera* appears where a Poplar or Willow is planted in a sheltered place.

The Prominents are on the whole sluggish insects. One can put a pin through a *Stauropus*-moth at rest without in the least disturbing it. A *Dicranura* thrown into the air will fall down to the ground like a piece of wood, and this may be repeated several times before the moth will issue to fly. I once put branches on which freshly emerged *Dicr. vinula* were resting into a full water-trough; though half a yard below the surface they kept clinging to the branch without awakening from their lethargic state, until want of breath induced them after some minutes slowly to crawl upwards out of the water. Moths of *Phalera* and *Datana* when handled keep the wings close to the body and can be rolled along the sandy ground without being induced to move. Specimens of *Pterostoma* and *Lophopteryx* fall to the ground when touched, remain lying on their side, and have even been observed to be attacked by ants in this state carried away some distance before showing any sign of life. And the caterpillar behaves just like the moth; being mostly soft and flabby they are slow and hesitating in their movements except when attacking.

The caterpillars of many species are gregarious when young, while others are found singly. Young *Phalera bucephala* larvae cover the underside of leaves, one specimen lying close to the other, and even when full-grown they do not disperse far on account of their inherent sluggishness. The eggs of *Dicr. vinula* are usually laid in pairs on leaves, and those of some *Cerura* quite singly. It is very remarkable how consistently year after year some species are met with in certain localities or even on certain individual trees, while the neighbouring trees which offer apparently exactly the same conditions of life are avoided. I found, for instance, for several years two trees of a group of Asps entirely denuded of leaves twice a year by the caterpillars of *Pygaera anastomosis*, whereas on the other trees of the group only single specimens were observed and these were evidently accidentally dispersed.

Owing to their preference for the higher trees in woods and avenues the *Notodontidae* are not injurious to agriculture and also not actually dangerous to forests. Real defoliation has been observed by me only in the case of Lime, Willow and Poplar, trees which all suffer extraordinarily little from the loss of the foliage. The Notodonts do not occur in such numbers that they can defoliate forests or whole nurseries, although we may meet with them very frequently in nature. As in the case of the distribution of the family, which will again be considered later on, also the yearly number of individuals is uncommonly constant, which accounts for the special role which the Prominents play in the fauna. It is quite surprising how constant is the abundance or rarity of the *Notodontidae* year after year in the various localities. Such an enormous difference in the abundance of specimens as is sometimes observed in certain other Lepidoptera, as e. g. in *Dendrolimus pini*, *Lymantria dispar* etc., which disappear sometimes for years and then again occur in incredibly large numbers, is entirely unknown among the Notodontids.

When we said above that most of our European Prominents are common species, either actually being found in numbers or appearing less frequently in collections because their home is difficult to reach, we did not mean to maintain that there are no great rarities here and there among them, species which either are on the verge of extinction or whose centre of distribution has not yet been discovered. I mention *Pygaera timon*, for instance, which is still very rare in collections, further *Rhegmatophila alpina*, which has a very small area of distribution, being restricted to the neighbourhood of Digne, and *Cerura verbasci*, which has nowadays almost disappeared from the dealers' lists. The strikingly marked *Uropyia meticulodina* from Eastern Asia is almost exclusively obtained by breeding, and the robust *Nadata cristata*, which has the facies of a Lasiocamp, is a rare catch at the lamp.

Most of the Notodonts have two broods in the temperate countries. The genera *Cerura*, *Pheosia*, *Notodonta*, *Pygaera*, *Pterostoma*, *Lophopteryx*, and *Drymonia*, some of which contain a considerable number of species, usually appear in the early spring and again late in the summer. A number of other genera have a so-called incomplete summer brood, e. g. *Stauropus fagi*, some of whose offspring appear as moths in the autumn of the same year, while the greater porportion of the pupae hibernate.

In a very small number of other genera the duration of the pupal stage does not appear to be ever shortened, or only exceptionally so, as for instance in most *Phalera*. Seasonal dimorphism has not been observed in the double-brooded species, with the exception of *Pygaera apicalis*, whose spring and summer broods have been proved by BEUTENMÜLLER to show a noteworthy difference.

The Notodonts are rather constant not only in the succeeding broods but also in the different districts. Only in certain areas of America did PACKARD believe to have observed local variation with a tendency towards melanism, but the did not consider the occurrence of the phenomenon established on suffficient evidence. In the Palearctic Region a darkening of the ground-colour is sometimes observed in the North (*Dicr. phantoma*), sometimes in the South (*Dicr. delavoiei*), and in other cases also in the East (*Hoplitis umbrosa*, *Gluphisia amurensis*). But the variation is on the whole so insignificant that the family must be considered one of the most constant.

The geographical distribution is very uniform. In the local faunae of Central Europe almost everywhere about 30 species of Prominents may be considered as indigenous, and in the whole Palearctic Region about 200 forms have been observed. In Northern Africa occur about 80 forms. South America, India and Africa have each 100—200 forms. The Australian Continent is decidedly poor, hardly a dozen species having been found; but some of these are very large, and the number will certainly increase as the exploration of Australia, especially the tropical northern districts, proceeds.

The variety exhibited in the facies of the *Notodontidae* is to some extent repeated in the details of the structure of their bodies and wings, so that we can give but few morphological characters which apply to the entire family. Moreover, an exact delimitation of the family is still wanting.

Head large, anteriorly quadrangular, covered with dense woolly hair, frons broad, between the antennae sometimes a crest of hair, and above the base of the antenna short tufts; capsule of head without groove for the reception of the shaft of the antenna at rest; occiput very short behind eyes and antennae. Antenna usually of normal length (about ½ the costa); always pectinate in ♂, sometimes to the tip, sometimes to two-thirds, the branches in some forms (*Datana*) long and characteristic in shape, or spread out (*Bireta plumosa*). Maxillae well-developed, the proboscis functionless, only said to be large in *Tarsolepis*, in the other Notodonts obsolescent. Palpi sometimes short, sometimes long, strongly hairy, sometimes abnormally long (*Pterostoma*). Thorax robust, broader than long, the prothorax very short, mesothorax transverse, metathorax above very narrow. The forewing narrow, elongate, with the costal margin straight or slightly convex, and the distal margin very oblique, usually entire, rarely dentate; the hind margin bears very commonly a tooth-like projection which is densely covered with hair-scales; the subcostal 5-branched, remaining close to the costal margin to the apex; the cell usually long and narrow, gradually increasing in width, middle median branch (vein 5) nearer to the upper than the lower angle. The hindwing rather small, ovate, as a rule far surpassed in length by the abdomen; costal edge straight, apex more rounded than is usually the case in the Noctuids, the distal margin evenly rounded; the hindwing as a rule much paler than the forewing, but the anal angle, on which lies the dorsal tooth of the forewing when the wings are folded in rest-position, has mostly the same colour and stile of marking as the forewing. Legs rather short and strong, the tibiae usually strongly hairy and in this case the anterior ones stretched forward when at rest; hind tibia with 2 pairs of spurs, fore tibia often with 1 pair. — Egg semiglobular, very flat. Larva in first stage with very large head, later on the facies often strongly modified and some structures abnormally enlarged, this being the case sometimes with the tails, sometimes with the posterior segments, or dorsal humps, or the thoracical legs. Pupa obtuse, rather strongly chitinised, some naked and without protection in the ground, others enclosed in a protective cover of leaves drawn together, or in a cocoon made of paperlike silk or even of bark gnawed into bits and formed into a hard wooden shell.

As mentioned above, the family of *Notodontidae* has not yet been sharply defined. Formerly considered as one of the most generalised families, the Prominents nowadays more and more come to be regarded as a recent grup strongly complicated by adaptations, and showing affinities to the Saturnids and especially the Sphingids.

1. Genus: **Tarsolepis** *Butl.*

This genus contains 3 species, which are among the largest known Indian Notodonts. The largest species, *T. fulgurifera Walk.*, occurs in North India, a second species is found on the Sunda Islands, and the third is widely distributed, also occurring over a large area of the Palearctic Region. In the ♂ the antenna is simple, or pectinate to beyond centre, base with dense tuft of scales, the apical portion setiform like the entire antenna of the ♀. Palpi upturned to nearly to centre of frons, segments 1 and 2 broad with scaling, end-segment short, cylindrical, thin, distinctly marked. Proboscis strong. Eyes naked. Abdomen long and slender, with dense anal tuft of remarkably large long-stalked scales. Forewing long, with sharp apex; distal margin very oblique, dentate, but otherwise straight, hind angle well marked, the hind margin rather short and slightly curved; veins 6 and 7 of forewing together from the anterior cell-angle, 8, 9 and 10 on a long stalk, which is touched by 8 in a point so that a long areole is formed, 8 terminating in the apex. Hindwing relatively short and broad, costal and distal margins moderately curved, the latter less dentate than on the forewing; veins 6 and 7 as in forewing; cell of both wings devided by a longitudinal vein-like incrassation. Middle tibia with 2, hind tibia with 4 spurs, middle and hind tibiae with a long brush of hair, hind femur with a long tuft of hair near the apex.

The genus is Palearctic and Oriental, and comprises only a few species of considerable size, whose facies is remarkably like that of the *Sphingidae*.

sommeri. **T. sommeri** *Hbn.* (= remicauda *Butl.*) (48 h). A large conspicuous species expanding up to 85 mm. Antenna of ♂ pectinate. Ground-colour of the wings dark brown, darkest and velvety in the centre of the forewing, more yellowish grey at the margins, especially at the costal margin; above vein 1 of forewing a large, sharply defined, triangular or wedge-shaped silver-spot and another between veins 3 and 4. Underside rather uniformly yellowish brown irrorated with dark scales, on forewing a small black discal spot, on hindwing a large one, both wings with a narrow dark median band. — From North India to the Sunda Islands (Borneo), over South China to the Philippines, being very plentiful on the latter group of islands. In the Paleactic Region in Japan, not rare on the main island and Kiushiu.

2. Genus: **Dudusa** *Walk.*

Nearly related to *Tarsolepis Butl.*, with which it agrees in size, structure of the antennae, the long body, the anal tuft of scales, and the shape of the wings. The thorax bears a high median crest of scales. The venation of the forewing differs from that of *Tarsolepis* in the stalk of 8 and 9 anastomosing with 7 beyond the origin of 10. The hind femur has no subapical tuft of long hairs. — This genus also is Palearctic, one species occurring as far as North China. Only 2 species are known, and curiously enough the species on which Walker based the genus became first known from North China, provided the locality is correct.

sphingiformis. **D. sphingiformis** *Moore* (44 a, erroneonsly called *nobilis*). Thorax pale brownish grey, with 2 black dots in the centre, which are sometimes indistinct, and on each side one near the base of the forewing; the erect crest of scales black-brown. Abdomen black-brown, with pale median line and pale lateral spots, anal brush black-brown. Forewing with pale greyish brown ground, traversed in the centre by a whitish lunulate double line curved twice; at the costal margin some black-brown spots, before the distal margin and at the hind margin with black-brown streaks; along the distal margin 3 lines composed of pale separate lunules. Hindwing dark grey-brown to black-brown, with ill-defined dark discal spot and two paler lunate lines along the distal margin, the anal area pale and usually rather extended. — North India as far as the southern Palearctic boundary; also in China (Pekin).

nobilis. **D. nobilis** *Walk.* Body similar to that of *sphingiformis*, thorax also with sharp black dots, but the anal brush contains, besides the black scales, numerous long pale reddish brown hairs. Basal area of forewing dark brown, only the extreme base white, with 3 black dots; at the costal margin a large white spot which is continued to the hind margin by 2 lunate lines and traversed by an oblique band running from the costal margin to the hind angle; along the distal margin lines of pale arcs as in *sphingiformis*. Hindwing black, paler at the hind margin, along the distal margin almost black pale-edged lunules. — Sunda Islands. We mention the species here because WALKER described it form "North China". The record, however, appears to be erroneous and the species not to be Palearctic at all.

3. Genus: **Damata** *Walk.*

Antennae in ♂ with very long branches to three-fourths, the apical portion simple, in ♀ shortly pectinated to the same point. Palpi moderately large, obliquely upturned and very densely scaled. Eyes naked. Body densely scaled, especially the thorax; abdomen extending for nearly half its length beyond the anal angle of the hindwing. Forewing strongly elongate and narrow, apex rounded, distal margin strongly oblique forming a very obtuse but distinct angle with the hind margin. Hindwing broad, the anal angle somewhat lobate. Nein 5 of forewing thrown off close below the upper angle of cell or even from vein 6, the latter stalked with 7, 8 and 9, vein 10 connected beyond 6 with the stalk of 7, 8, 9, forming an areole. In hindwing vein 5 likewise close to upper cell-angle, 6 and 7 stalked, 8 free.

D. longipennis *Walk.* (44 a). Antennae and body deep black brown, patagia white with dark brown edge. Wings white; forewing densely dusted with single black scales, in basal as well as apical halves with a costal and a hindmarginal black dot one below the other, the basal dots especially large, being only slightly seperated or even confluent; the distal costal dot drawn out into a point and continued by a lunate line, which sometimes reaches the hindmarginal dot; marginal spots well developed, a number of still smaller dots along the costal edge. On the hindwing the anal angle blackish, the distal margin in ♂ narrowly, in ♀ broadly edged with black-brown, fringes with white dots. — In North India, especially Kashmir; the specimen figured came from the Kulu district. *longipennis.*

4. Genus: **Cerura** *Schrank.*

Antennae pectinated in both sexes to the tip, the branches long in ♂, short in ♀. Palpi porrect, short, only slightly extending beyond frons, above with soft hair, below bristly. Proboscis vestigial. Eyes naked ocelli absent. Frons, thorax and base of antennae densely hairy, also the abdomen densely covered with woolly hair, elongate, but obtuse, considerably extending beyond the anal angle of the hindwing. Forewing elongate, narrow, obtusely triangular, costal margin quite straight close to the apex; the latter slightly rounded, distal margin strongly obtuse, slightly curved, forming an obtuse angle with the hind margin. Hindwing almost semicircular, with the costal margin slightly curved. In forewing veins 6, 7, 8, 9, 10 on a stalk from upper cell-angle, or 10 from cell, 10 anastomosing with stalk of 7, 8, 9, forming a small areole. In hindwing veins 6 and 7 on a very long stalk. Hind tibia with short end-spurs only.

The scheme of wing-markings is very uniform in the various species, apart from slight modifications, only *verbasci* from Southern France and Northern Spain deviating more strongly. The forewing bears a black basal dot and a transverse row of 4 or 5 subbasal ones, further, across the cell and the whole width of the wing a more or less broad, continuous, constricted or interrupted, grey to greyish black band, which is usually sharply bordered with black or yellow; beyond the black discal dot there are 2 transverse dentate lines which run across the whole wing, the outer one being accompanied by a subapical band, which is coloured like the transverse band and as a rule reaches from the costal margin to vein 4. Both wings bear sharp black marginal dots, and the hindwing has, besides the black discal spot, a blackish and often obsolescent submarginal band, which is however sometimes absent.

Eggs flat, lentil-shaped. Larva, generally known as puss, almost naked, only bearing short and dispersed hair; broadest in front, with 14 legs. Head retractile into the thorax, at the apex of segment 1 two lateral tubercles which are either short and blunt or rather long and pointed, at the hind margin of segment 2 a broad obtuse median projection; anal claspers modified into two long filamentous processes directed backwards, from which two thin red threads serving as organs of defense can be projected. The larva when molested assumes a threatening attitude, retracting the head very strongly, somewhat raising the thorax, which has become broadened, and projecting the filaments from the likewise raised tails. They feed on deciduous trees, especially Poplar, Birch and Willow. Pupa short, broad and compact, with rounded anal end: in an extraordinary strong and hard cocoon, which consists of a trough-like cavity gnawed into the trunk or branch of a tree and vaulted over by a roof made of the chips cemented together by a secretion from the mouth, the cocoon therefore appearing externally as an usually rather flat hump closely appressed to the trunk or branch. Distributed in the Palearctic Region and North America.

C. verbasci *F.* (44 b). White, thorax beneath with black-blue markings, abdomen with narrow blackish belts. Forewing glossy white with black-blue markings, viz., a series of 6 costal dots, a prediscal band com- *verbasci.*

mencing at the second dot and upon which follow 4 black transverse spots in cellule 1 b, a subapical band extending from the costal margin to vein 4, a small discal spot followed by two narrow transverse stripes, and some innermarginal dots; the black dots at the tips of the veins are larger posteriorly. There are also some orange-yellow spots present, viz., at the costal margin between the last costal dot and the subapical band, at the margin close to the anal angle, and two smaller ones in cellule 1 b at the inner margin of the transverse band. Hindwing white. Southern France and North-Eastern Spain. — Larva similar to that of *C. bicuspis*, the red-brown dorsal marking not interrupted laterally, two white-centred black lateral spots on abdominal segments 2 and 7. June and autumn on species of Salix. — The name of the species is a misnomer, being derived from a plant on which the larva does not feed. During recent years the species has become much rarer in collections than formerly. It is doubtless a local insect in contradistinction to most of its congeners.

aeruginosa. **C. aeruginosa** *Christ.* (44 b). Antennae rust-yellow with dark brown branches; body likewise yellowish, with black markings. Forewing light ochreous with prominent black basal dot; the median transverse band almost of even width, being only slightly constricted, its outer edge without sinus, but with some small teeth in front of the hind margin, the edges distinctly darker, black; within the band a thin black transverse line instead of subbasal dots; the subapical band narrow, continued from vein 5 as a dentate line; marginal dots sharply marked. Hindwing with dark discal spot, ill-defined median shadow, and sharp black marginal spots. — Sarepta, Issyk-kul. Larva until autumn (Sept.) on Willow (Salix stipularis), very similar to the larva of *C. furcula*. Pupa in a hard cocoon on the bark of Willows. Moth in June.

intercalaris. **C. intercalaris** *Gr.-Grsh.* Allied to *aeruginosa Christ.* Antennae black; head, prothorax and forewing light yellowish grey; the transverse band narrow, proximally sinuate, distally almost straight, narrowly edged with ochreous; the other wing-markings but very slightly indicated, the discal spot absent. Abdomen and hindwing paler than the forewing, whitish. — North-East China (Tientsin).

bicuspis. **C. bicuspis** *Borkh.* (= forficula *Fisch.-Waldh.*) (44 b). The black transverse band of the forewing very prominent and quite unicolorous, without lighter shade, deeply constricted before centre, its margins hardly darker, with slight yellow borders; the subapical band likewise deep in colour, marginal dots large and sharply defined. The black belts of the abdomen sharp, only narrowly interrupted. In Central Europe, from the Carpathians, Eastern Alps and the northern districts of Switzerland to Sweden and Finland, also in England, but not in Holland, everywhere rare, in April-May and again in August. Eastwards to Moscow and Kasan. — *infumata.* The East-Siberian form, **infumata** *Stgr.*, from the Ussuri district, has the wings strongly darkened by smoke-colour, the black markings, however, remaining prominent, by which character it is easily distinguished from *lanigera*, which occurs together with *infumata*. Its larva does not differ from European specimens and feeds *transiens.* like these on Birch. — The East-Russian form **transiens** *Krulik.*, described from the district of Viatka, is a *japonica.* transition from true *bicuspis* to the East-Siberian *infumata*. — Japanese specimens, **japonica** *form. nov.* (44 c), are similar to *transiens*, differing from *infumata* likewise in their paler colouring, but represent perhaps a distinct species. — Larva yellowish green, with red dots; the triangular red-brown thoracical spot has whitish edges and is separated from the similarly coloured dorsal stripe of the abdomen; this stripe is narrow on segment 1, where it commences, widened to the spiracles on segment 4, then narrowed, and again widened at the apex of the abdomen, ending in a small black spot; anal filaments with broad red-brown rings. July to September, especially on Birch, more rarely on Aspen and Alder. — This species comes undoubtedly very close to the North-American *borealis Bdv.*

lanigera. **C. lanigera** *Butl.* (44 b as *lonigera*). Closely allied the dark East-Asiatic *infumata*, a form of *bicuspis*; but the forewing, especially its centre, still somewhat darker in tint, the bands therefore being less prominent; the transverse band strongly constricted, as in *bicuspis*, but not in all the specimens according to Leech. Amurland, Corea and Japan, rather abundant throughout Amurland. Larva very similar to that of *bifida*, feeding like this on Aspen until the autumn, more rarely on Willow and never on Birch. The pupa sometimes hibernates *pulvigera.* twice. — In Armenia (Lagodechi) occurs **pulvigera** *Stgr.*, which its author places as a variety of this species; the upperside of the wings is dusted with deeper black, the median band is a little broader and distally excised, and the underside is of a lighter tint.

furcula. **C. furcula** *Clerck* (= bicuspis *Bdv.*, fuscinula *Dup.*, occidentalis *Lintn.*, salicis *Lenn.*) (44 c). The blackish grey median band is sharply edged with black, its distal sinus usually extends only to the apex of the cell; beyond the middle 3 parallel dentate lines. Almost throughout Europe, northward to Lapland, southward to Central Italy and Portugal, eastward found in northern Asia Minor, Amurland, Northern China, and Corea; occurs also in North America. In Central-Europa usually 2 broods, the first in May and June, the second in August. — *borealis.* In **borealis** *Borkh.* (44 c), from Lapland and Northern Russia, thorax and wings are blackish smoke-colour; spe- *sangaica.* cimens from Amurland also are somewhat darker than those from Central and Southern Europe. — **sangaica** *Moore*, which inhabits North and Central China, is distinguished by its narrower median band. — Egg black. The larva at first blackish, later stages yellowish green dotted with red, a large patch on the thorax and continuous with it dorsal spots on abdominal segments 1—8 dark red-brown; the spot on segment 4 largest, extending sideways to the stigmata. Head of the same colour as the spots. Anal filaments with red-brown rings.

July and September—Oktober, especially on Sallow, but also on Aspen, Birch, and Beech. Pupa in a brown cocoon, yellowish brown with greenish wing-cases; frequently hibernates twice.

bifida. **C. bifida** *Hbn.* (= furcula *Esp.*, hermelina *Kirby*, latifascia *Curt.*, ajatar *Schilde*) (44 c). Differs from its nearest ally, *furcula*, apart from the somewhat larger size, in the much broader and sharper black edges to the median band, which bears an evenly incurved shallow sinus on the distal side to below vein 2; of the exterior dentate lines usually only 2 are well developed. Likewise throughout Europe, northward to Lapland, southward to Portugal, Northern Spain, Central Italy, Greece, Asia Minor, Armenia to Persia, Altai. — As in the case of *furcula*, a northern resp. Scandinavian-Laponian race is distinguished by its dark smoky ground-colour, *saltensis.* **saltensis** *Schöyen.* — In Southern France and Spain the species is likewise represented by a special race, *urocera.* **urocera** *Bdv.*, in which the markings are less developed, or some even entirely obsolete, especially in the marginal area. — *fuscinula Steph.*, *arcuata Steph.*, *integra Steph.* and *latifascia Curt.*, which were described from England, are hardly different from true *bifida*. — Egg black. Larva similar to that of *furcula*, with similar dark red-brown dorsal spots; first stage blackish, later ones yellowish green with sparse red lateral dots; the large triangular thoracical patch divided by a narrow pale median line and irregularly variegated with light spots, as well as edged with reddish yellow. The dorsal abdominal spots extend to the anal segment. End of July to September on species of Populus, especial Aspen. Pupa pale brown, in a dark brown cocoon. Moth early in June.

interrupta. **C. interrupta** *Christ.* (44 c). Ground-colour paler than in *bifida*, no yellow markings; the median band of ♂ usually interrupted, in ♀ at least strongly constricted, the posterior portion of the band always very narrow. Distributed in the eastern Mediterranean districts, Sarepta, Caucasus, throughout Asia Minor, Persia, Kurdistan, Syria, and also in Tunisia. Together with the ordinary form occurs a variety with the band rather broader, but likewise strongly constricted, *petri.* **petri** *Alph.*, being recognized as belonging to *interrupta* especially by the absence of yellow markings. — Larva pale bluish green, with whitish dorsum; thoracical patch and dorsal stripe dark brown and continuous. August and September on Populus nigra.

ludovicae. **C. ludoviciae** *Püng.* Closely allied to *interrupta*; head, thorax and forewing whitish yellow, the median band rather narrow, widened at the costal and hind margins, dusted with blackish grey and edged with a darker colour; discal spot and the two proximal dentate lines only feebly indicated, the outer dentate line and the marginal dots prominent. Hindwing pure white, with vestigial marginal dots. — Chinese Turkestan. Possibly a local race of *interrupta*.

syra. **C. syra** *Gr.-Grsh.* Allied to *interrupta Christ.* and *intercallaris Gr.-Grsh.* Forewing pale reddish grey, lighter (yellowish grey) at the costal and distal margins; transverse band narrow, grey, several times interrupted, edged with black and yellow; the long subapical spot coloured and bordered like the band; the other markings scarcely indicated. Hindwing white, with black discal spot and diffuse blackish submarginal band, which is sometimes absent. Antenna white, with black pectinations, body white, thorax grey in the centre, with 3 yellow streaks. Syria.

5. Genus: **Dicranura** *Bdv.*

This genus is very close to *Cerura*, but the species it contains are larger and more robust. Antennae pectinated to the tip, the branches very long in ♂, short in ♀; palpus small, porrect, and densely hairy, the whole body, especially the thorax and the legs, also densely woolly. In the forewing veins 6—9 stalked together forming an areole with 10, vein 5 close to upper angle of cell. The ground-colour of the body and wings is white or grey, the thorax and abdomen bearing black dots and spots; the basal area of the forewing is similarly marked as in *Cerura*, bearing a broad blackish transverse band accompanied by dots; the outer half of the wing has a very large number of deeply zigzag transverse parallel lines. — Eggs hemispherical, dark red-brown, the flat under surface encircled by a white ring. The larvae resemble those of *Cerura*, only being larger and the dorsal tubercle always being placed on the third thoracical segment. Pupa and cocoon as in *Cerura*. When irritated the larva retracts the head into the thorax, raises the fore and aft parts and remains motionless in this threatening altitude, the long thin red tail-threads being projected and the glands situated on these threads emitting a nauseous scent. At the same time a strongly corrosive secretion exudes from two glands which open at the head. — Distributed from Europe to Japan, China and the Himalayas, southward into the Sahara as far as Poplars and Willows occur. The species has but one brood in the northern districts, only very occasionally some specimens appear in the autumn, which however do not produce a second brood as is the case with all *Cerura*. At the southern boundary, in southern Algeria, the larvae pupate already in June, but remain in the pupal stage until the next spring.

erminea. **D. erminea** *Esp.* (44 d), Ermine. Middle segments of abdomen above black with white median stripe, the last two segments white with black longitudinal stripes. Ground-colour of wings white or pale whitish grey, with the usual black basal dots, zigzag bands and black veins. In Central Europe with the exception of Den-

mark, Holland and England, rare everywhere, extending northward to Livonia, southward to Central Italy,
candida. eastward to Eastern Russia and the Bukovina; also in Amurland and Japan. — A lighter-coloured form, **candida**
Stgr., has been separated; its wings are almost pure white with feeble markings and pale veins; first described
from the Ussuri district, but also known from Europe. The larva of this form feeds on Aspen in Amurland. —
menciana. **menciana** *Moore*, which appears to occur only in China, has on the contrary the markings more prominent and
the ground darker, violet-grey. Specimens from Japan agree in all essentials with Chinese ones. — Larva at
first blackish, full-grown pale green with dark red-brown dorsal marking, which has a violet tint and is edged
with white, the marking being similar to that found in *Cerura*; the large triangular thoracical patch, in front of
which there is a black dot at each side, narrows to the tubercle and is continuous with the dorsal abdominal stripe,
the latter widening on segment 4 to the spiracles, then strongly narrowing and again somewhat widening posteriorly;
on segment 4 a white transverse stripe narrowly edged with red extends from the red patch to the legs.
Stigmata bordered with black. June to September, on Salix and Populus.

przewalskii. **D. przewalskii** *Alph.* (44 d). Ground-colour pure white. Forewing with very sparse remnants of the black markings, most distinct being the discal spot in both wings. Thorax with the usual black dots, abdomen entirely white. The antenna of ♂ exceedingly strongly pectinate, more strongly so than in *D. vinula*. — Central Asia: Issyk-kul, Tian-shan, East Turkestan (Kashgar).

vinula. **D. vinula** *L.* Occurring throughout the Palearctic Region and varying much in colour. The ground-colour
fluctuates between a very light greyish white and an almost uniform black. Thorax lighter or darker
grey, with the usual black dots; abdomen blackish grey with the edges of the segments more or less broadly
white. The forewing bears a grey transverse band beyond the black basal dots, a distinct discal spot and on
the outer half two transverse lines which are exceedingly deeply zigzag; black streaks extend from the marginal
dots. In the hindwing the marginal dots and discal spot are sometimes absent. Throughout Europe (in the
north as far as Lapland), North Africa, Asia Minor, Persia, Central-Asia, Siberia to Amurland and Japan. True
vinula (44 f), from Europe, has the ground light greyish white to grey, the markings of the forewing sharply
minax. defined and the marginal dots of the hindwing usually distinct. — A very similar form is **minax** *Hbn.* (44 e)
with the subbasal band of the forewing more prominent and the marginal dots of the hindwing absent. Our
estonica. figure is taken from a specimen with the markings especially dark and sharp. — **estonica** *Huene* is remarkable
for its exceptionally sparse scaling, only the basal third of the forewing to beyond the grey band being normal
in scaling and markings; the outer two-thirds and the hindwing are very thinly scaled and without markings.
The form was first described from Esthonia and Ingermanland, but occurs also in Western Europe, being already
arctica. recorded by Borkhausen. — **arctica** *Zell.*, which occurs in Northern Scandinavia and Lapland, is strongly
darkened, the ground-colour being blackish grey and the base of the forewing and the space between the zigzag
lines light; markings still distinct, and the darkened abdomen still bears some light-coloured hair. It is a transition
phantoma. to **phantoma** *Dalm.* (44 f), which is found in Lapland and has the wings and the upperside of the abdomen
delavoiei. usually uniformly black. — The form from North-West Africa, **delavoiei** *Gaschet* (44 f, g), is likewise darker
than true *vinula*, the forewing being uniformly smoky grey, but bearing sharp markings, and the hindwing dark
brown-grey. It is found in May in Algeria, Tunisia and Morocco, and extends as far south into the Sahara
as the food-plants occur. It is remarkable that the eggs are deposited in a different way as in *vinula* according
to K. Dietze (Jugenheim), not being laid singly or in pairs, but in clusters of about 20 on the trunk or the
leaf. The larva, too, is somewhat different from that of *vinula*, and is so abundant in some years in North Africa
intermedia. that many Poplars are entirely defoliated by it. — **intermedia** *Teich.*, from the Ararat and Kurdistan, which
was described as a distinct species and is still insufficiently known, is probably also a form of *vinula*; it is larger
than ordinary specimens of this species, and the zigzag lines are more prominent and more pointed. — In Amurland,
felina. Corea and Japan, the species is represented by a somewhat different form, **felina** *Butl.* (= askolda *Oberth.*)
(44 e), which is distinguished by the black-edged patagia, very dark brown veins, white ground to both wings
and especially deeply dentate postdiscal lines of the forewing. Discal spot and marginal dots of hindwing sharply
marked. — Larva similar to that of *D. erminea*, at first glossy black, then bright green, with the same dark
red-brown dorsal marking as in *erminea*, but the dilatation and the white transverse stripe on segment 4 are
not present. The tail-threads are longer than in *erminea*. Shortly before pupation the larva becomes dark
red to violet; it turns into a chrysalis in about 3 weeks after spinning up, the pupa, which hibernates, being
dark brown. June to September on various species of Populus and Salix. The young caterpillar usually rests
on the middle of the leaf, which it covers with a fine web for a foothold. Many of the young larvae are destroyed
by carniverous Rhynchota, particularly species of Nabis, which attack them when they walk to the
edge of the leaf to eat. The caterpillar is also very frequently infested by Tachinids. When intending to pupate
the caterpillar walks down the tree-trunk, usually between 6 and 8 a. m., and makes the wooden cocoon
1—2½ metres above the ground. Full-fed larvae which are collected found on such occasions as well a
the pupae are hardly ever infested with parasites, as the Tachinid larvae cannot break through the cocoon

and therefore would perish, which has indeed been observed in exceptional cases. The pupa very rarely lies over and can also hardly be forced, pupae kept in a warm place during the winter giving the moth scarcely earlier than wild pupae.

D. himalayana *Moore* (49 c). A form from Dharmsala near the Palearctic boundary. It is very *himalayana.* close to the purely Palearctic *vinula*, also recalling the form *menciana* of *erminea* by its wing-markings. The ground-colour of the wings is rather darker than in the East-Asiatic *felina*, the grey subbasal band being very distinct and the two postdiscal zigzag lines placed even nearer together than in *vinula*. The larva feeds on Salix.

6. Genus: **Stauropus** *Germ.*

Antennae variable, either in ♂ very strongly pectinate for $^2/_3$ and in ♀ simple, only bearing short bristles beneath, or pectinate in both sexes (*viridescens*), or in ♂ with short fascicles of bristles and in ♀ simple. Palpi porrect, only a little projecting beyond frons, with bristly hair and reduced end-segment. Proboscis vestigial. Eyes naked; ocelli absent. Body densely covered with woolly hair, especially the thorax, legs and apex of abdomen; abdominal segments 1—5 with a dorsal brush of hair each. Hind tibia only with 2 apical spurs. Forewing very elongate, with rather acute apex, the distal margin being strongly oblique and merging into the hind margin in a wide even curve; areole absent, vein 5 from the centre of the discocellulars, 6 from the upper angle of cell together with the stalk of 7, 8, 9, 10. Hindwing broad, evenly rounded; vein 5 as in forewing, 6 and 7 stalked, 8 free or connected with cell at middle of same by a short bar.

The ground-colour of the wings is always dull greyish brown to grey, sometimes greenish or in places reddish; the markings consist of light transverse dentate lines and rows of spots. The narrow hair-like scales which are found everywhere among the broader scales, in connection with the indefinite ground-colour, give the moths a remarkably soft and delicate appearance.

The larvae of this genus have several peculiar and quite exceptional characteristics which render them exceedingly strange. Head rather high and narrow. Meso- and metathoracical legs very strongly prolonged, thin, rod-like. Abdominal segments 1—5 with two tubercles each, which are most strongly developed on segments 1—3, ending here in a short sharp point. The last 2 segments strongly widened, quite flat beneath, the sharp edge of the widened sides armed with short pointed teeth. Anal claspers modified into two long, thin, pointed processes. Head and body covered with very short but rather dense hair. The larvae rest with the anterior and posterior ends raised, the long thoracical legs being crossed one over the other. Pupa in a pale loose cocoon between leaves, black-brown, strongly glossy, the apex of abdomen ending in a point bearing 2 small bristles.

The European fauna contains only one species, which is distributed to East Siberia and Japan; from Japan and China 5 species are known, which apparently are confined to East Asia, 2 others from Central Asia. On the other hand a whole series of species occur in India, some of which extend in the Himalayas into the most southern districts of the Palearctic Region.

S. fagi *L.* (44 g), Lobster Moth. Wings grey-brown; forewing with light grey base and black basal dot, *fagi.* a pale dentate band at the border of the light basal area and another in the centre, before the margin a row of dark submarginal dots which are edged with white proximally; hind margin usually red-brown. Hindwing with some light spots in the centre of the costal margin. Antennae red-brown, head and thorax grey-brown to mouse-grey, abdomen lighter. Underside of forewing light grey-brown, of hindwing and abdomen light greyish yellow. Throughout Europe with the exception of the most southern districts, occurring as far as Portugal, Central Italy and Bulgaria, and nothward to Sweden and Livonia; Russia (Ural), Armenia, Amurland, Japan. Together with the typical form occurs in Europe a form with the forewing darkened and sharply marked; this is ab. **obscura** *Rebel.* — The Japanese form, **persimilis** *Butl.* (44 g), is somewhat smaller than true *obscura.* *fagi*, with more uniformly red-brown colouring and less obvious light basal area of the forewing. — Larva *persimilis.* yellowish brown to dark brown, with black longitudinal lines on the 3 anterior pairs of tubercles, the lines of the second and third pairs being continued as oblique lateral stripes to the stigmata. On abdominal segments 1 and 2 a black spot below the stigmata, on 3 to 6 a narrow black lateral line situated just above the spiracles. June to autumn on Beech, Oak, Lime, Hazel, Walnut. In captivity it is necessary always to provide fresh food for the larvae and also to give them water to drink. The larvae are quarrelsome and mordaceous, and collectors have been warned not to keep a number together as they wound each other. This, though denied by some, has lately been proved to be true in the case of faulty treatment. It is very difficult to feed up larvae collected when very young, moulting being especially perilous for the larvae on account of their irregular shape. Pupa glossy black-brown, in a light pale grey cocoon which is placed between leaves. Early larvae give the moths already in June or August, while from those pupating at the end of July or later the moths appear in May or June of the following year. The moths come to the light; they rest in day-time closely appressed to tree trunks, the strongly woolly fore legs being held stretched forward as in *Dasychira pudibunda.*

basalis. **S. basalis** *Moore* (= taczanowskii *Oberth.*) (44 g), from China (Shanghai) and Japan, is considerably smaller than *fagi*; the forewing is comparatively broader, the light basal area extends across the first transverse band to the median band. — Specimens of this species from Japan have less sharp markings and a uniform and pale brown ground-colour. There is a distinct red tone in the median band. We call this form **niphonica** *n. ab.* (44 g). *niphonica.*

comatus. **S. comatus** *Leech.* Forewing white, base and hind margin brownish grey with black markings, beyond cell a brownish grey spot between costal margin and vein 5. Hindwing white, with brown-grey submarginal band, which becomes narrow and indistinct below vein 3; the hindmarginal half suffused with blackish and bearing white hair. — West China (Omei-Shan).

berberisae. **S. berberisae** *Moore* (49 a) is really an Oriental form, occurring at the boundary of our region in the Himalayas (Dharmsala) to the south of Kashmir. Ground-colour very dark brown; the markings similar to those of *fagi*, sharply expressed, black, edged with white proximally. The larva feeds on Berberisa in July and August.

viridescens. **S. viridescens** *Walk.* A large species for this genus, the ♀ having an expanse of up to 100 mm. Body grey-brown, collar and patagia, hind edge of thorax and apex of abdomen green. Forewing grey-green with 2 subbasal, 2 prediscal, and 3 postdiscal black-brown lines of arcs, as well as 1 submarginal one; in ♀ the median area of the forewing between the pre- and postdiscal lines as well as the base brownish. Hindwing grey-brown with lighter costal margin. — Widely distributed in the Oriental Region, and extending northward to China. The species being an essentially Indian insect, it will be figured in vol. X.

bidentatus. **S. bidentatus** *Wileman.* Head and thorax white-grey, collar and patagia edged with black-brown. Forewing with the same light ground-colour; the entire median area from the hind margin foreward occupied by a large dark brown spot which is shallowly excised before the hind margin, so that it bears here two pointed projections; the central portion of the hind margin below the patch white; on the outer half of the wing a postdiscal white transverse band and a submarginal one, between which there is a dark costal spot; along the margin a blackish line of arcs, the fringes spotted with blackish at the veins. Hindwing and abdomen grey-brown, the former with a paler median band and whitish fringes with dark spots. — Japan (Hondo).

nigrilinea. **S.** (?) **nigrilinea** *Leech.* Head and collar blackish, patagia grey; hind margin of thorax and the abdomen grey-brown. Forewing greyish, sparsely dusted with black scales; a narrow black streak runs from the hind margin obliquely to the apex of the cell and thence to the distal margin. Hindwing grey-brown. — Central China (Chang-Yang).

lama. **S. lama** *Oberth.* (48 g). Forewing and thorax ashy grey, irrorated with dispersed black scales, the anterior portion being lighter; below the cell an elongate black basal spot reaching to the prediscal band, which is composed of isolated black spots; postdiscal band broad, composed of continuous black spots; before the margin a black transverse line. Hindwing grey-brown, the costal margin with blackish apical spot. — Siao-lu, at the Chinese-Tibetan frontier.

picteti. **S. picteti** *Oberth.* (48 g). A rather large species, recalling *fagi* by its scheme of markings. The large basal patch of the forewing reaches to the prediscal band and is bright grey-green; in front of the black discal spot some black dots in the cell, the postdiscal dentate band as well as its pale edges indistinct; the row of black submarginal spots as in *fagi*, but without light proximal border. Hindwing lighter grey-brown, the basal half of the costal area green. — Siao-lu.

7. Genus: **Cnethodonta** *Stgr.*

Allied to *Stauropus.* Antennae of both sexes pectinate to the tip, the pectinations long in ♂, short in ♀. Palpi longer than in *Stauropus*, distinctly projecting beyond the frons, being slightly upturned. Tongue vestigial. Eye naked. Legs clothed with dense woolly hair, nearly as in *Stauropus*, hind tibia with terminal spurs. Abdomen with apical tuft, which is short in ♀. Forewing relatively broad, the costal margin slightly curved in distal half, distal margin not very strongly oblique, likewise slightly curved, hind angle obtuse. Hindwing broad, with the hind margin almost straight. In forewing veins 3 and 4 close together from lower angle of cell, 7, 8, 9 and 10 stalked, without areole. In hindwing veins 3 and 4 together from lower cell-angle, which is pointed and much produced, 5 from before the centre of the discocellulars, 6 and 7 on a long stalk, 8 touching centre of cell in a point. — The genus appears to be restricted to Eastern Asia, whence 4 species are known.

grisescens. **C. grisescens** *Stgr.* (= aeronyeta *Oberth.* ♀) (45 b). Head and thorax grey; abdomen grey-brown. Forewing light grey-white, dusted everywhere with black-brown scales, a prediscal transverse line and a postdiscal one, as well as a discal spot and a row of submarginal spots likewise black-brown; the dark scales of which the lines and spots are composed are semi-erect. Hindwing grey-brown with the costal margin paler. — Amurland and Japan.

pryeri. **C. pryeri** *Leech.* Forewing grey-white, irrorated with dark scaling; an interrupted subbasal band blackish, a prediscal line and a postdiscal one dark, beyond the latter an irregular dark macular band. Hindwing grey-brown with paler apex. — Japan.

C. cyanea *Leech* (45 a). Head and thorax grey, abdomen grey-brown. Forewing dark reddish brown, with a brownish suffusion in ♂, a more greenish suffusion in ♀, a curved postdiscal band indistinct. Hindwing light grey-brown with darker margin. — Japan. *cyanea.*

C. pustulifera *Oberth.* (48g). Uniformly yellowish grey, abdomen with blackish lateral spots. On the wings a number of white, partly black-edged, tufts of scales, which indicate an indistinct prediscal line and a postdiscal one, and are arranged in a row before the distal margin; at the apex of the cell a similar white spot; fringes spotted with black. — Ta-tsien-lu. *pustulifera.*

8. Genus: **Exæreta** *Hbn.*

Antennae in ♂ with long pectinations to $^2/_3$, the rest being thin, filiform, like the entire antenna of ♀. Palpi short, with long bristly hair. Proboscis moderately long. Eyes naked; ocelli present but small. Forewing very long and narrow, its costal margin quite straight to close to apex, distal margin first steep, then strongly oblique, forming a very obtuse angle with the hind margin; vein 5 from the centre of the discocellulars, 6 close to upper cell-angle, from which the stalk of 7, 8, 9 is thrown off, 10 free from cell, forming an areole with the stalk of 7, 8, 9. Hindwing likewise rather elongate, nearly semicircular, with the distal margin somewhat undulate; vein 5 very feebly developed, 6 and 7 on a short stalk. Thorax and abdomen smoothly hairy, legs with very long dense woolly hair; hind tibia with mid- and end-spurs. — Larva long cylindrical, with short minute hair, 14 legs, on abdominal segments 1 and 8 a small conical tubercle; head incised at vertex; anal legs modified into 2 long, divergent, rod-like processes which are widened in button-shape at the tip. Pupa with 2 divergent anal brushes of hair; in the ground in a hard cell. — The only species is:

E. ulmi *Schiff.* (= cassinia *Esp.*) (46 d). Head and thorax grey, abdomen pale grey-brown. Forewing grey, with darker spots, especially obvious being an oblique transverse spot at apex of cell commencing at costal margin, a postdiscal row of white-edged black vein-dots and a similar row of dots between the veins close to the margin. Hindwing whitish, with brownish margin and brown veins. — South Germany from Southern Baden eastward, Northern Switzerland, Southern Tyrol, Lower Austria, Croatia, Dalmatia, Hungary, Roumania and Southern Russia; southward to Corsica and Central Italy; also Armenia and Amurland. In Central Europe only in some places; the moth very rare as compared with the fairly abundant caterpillar. The latter yellowish green to brownish or reddish, densely variegated with small light yellow spots which bear a short hair each; on the back a blackish longitudinal line composed of single bars extending across the segmental incisions. June and July. Pupa at the foot of the food-tree, black-brown, hibernating. Moth in April and May. The larvae are best collected by beating, as they jump off when one knocks against the branch, wriggle about on the ground and then hurry towards the trunk of the tree. They sometimes defoliate the trees, the larvae coming down like rain when the trees are beaten, as in the case of *Phalera bucephala* on young limes. The larva feeds only on Elm, is full-fed in July and makes in the ground a roundish cell, from which the moth emerges in the following April. As the caterpillar is very difficult to feed up in captivity, it is advisable to take only full grown ones which show already by the dulness of the originally yellowish colour that they are close before pupation (Arno Wagner). *ulmi.*

9. Genus: **Fentonia** *Butl.*

Antennae in ♂ either pectinate to the apex or the distal half only shortly dentate, in ♀ setiform. Palpi upturned to the centre of frons, with a short pointed end-segment. Proboscis present. Eyes naked. Abdomen elongate, its apical third extending beyond hindwing. Hair on femora and tibiae very long, dense and woolly; mid tibia with apical spurs, hind tibia with median and apical ones. Forewing elongate, with produced apex, distal margin strongly oblique, almost the same in length as hind margin, hind angle very obtuse; hindwing broad; veins 3 and 4 of forewing widely separate, 6, 7 and 8 stalked, 9 from 10, anastomosing with 8, forming a long areole. In hindwing 6 and 7 on a short or long stalk. — The genus is essentially Indian, most of the species occurring in Anterior India. It is represented in the Palearctic Region by 4 East-Asiatic species, of which 2 have only lately been described.

F. ocypete *Butl.* (= laevis *Butl.*) (45 b). Body grey brown, variegated with white hairs on head and thorax, which are thereby rendered lighter in colour. Forewing grey-brown, in the typical form prominently pale brown in the cell and in the basal portion of the hindmarginal area, with black streaks and transverse lines: along the median a black streak, a pair of parallel blackish lines before the middle and another pair beyond the middle, the former rather diffuse, dentate, the latter well defined, strongly excurved below the cell; a submarginal dentate line diffuse, and a dark marginal line distinct. Hindwing light grey-brown, darker at the anal angle. Amurland, Corea and Japan; also at Simla (North India). — The Japanese specimens evidently *ocypete.*

japonica. belong to a special form, which we call **japonica** *form. nov.* (45 b). The markings are somewhat less prominent, the black streak on the median vein is absent, likewise the light brown colouring, which is replaced by a bandlike light grey median area reaching from first double line to the apex of the cell.

sordida. **F. sordida** *Wileman.* Forewing brownish grey with a slight reddish tint, the outer area of the forewing darker brown; prediscal band directed obliquely back-and outward, being black in its costal half and accompanied by 2 black dots at the costal margin; the postdiscal dentate band double, blackish, slightly incurved below the middle; along the distal margin a dark line of arcs commencing at the costal margin with a prominent black spot; at the outer half of the costal margin a row of black dots. Hindwing dark brown, the fringes paler. — Japan (Hondo).

nihonica. **F. nihonica** *Wileman.* Thorax and forewing whitish grey, irrorated with numerous black scales; besides the usual two transverse bands there is a rather prominent blackish subbasal dentate band; prediscal band double, sharply defined and dentate, running obliquely back- and outward; the anterior half of the space between it and the subbasal band darkened; postdiscal band likewise prominent, irregularly dentate, excurved below the cell; between it and the apex a dark costal spot edged with black proximally and distally; along the distal margin a line of blackish arcs; discal spot sharply defined, black. Hindwing dark brown, with pale fringes. — Japan (Hondo).

concentrica. **F. concentrica** *Oberth.* (48 h). Somewhat resembling *F. ocypete* in the scheme of markings; groundcolour uniformly dark grey-brown, forewing without the yellowish longitudinal stripe, being slightly lighter only below the cell; beyond the centre a sharply marked black semicircular transverse band upon which follows, parallel with it, a whitish band, which does not quite reach the costal margin; beyond this band a row of black vein-dots; before the black band an indistinct, deeply dentate, discal band composed of 2 blackish parallel lines. Hindwing uniformly grey-brown. — Ta-tsien-lu.

10. Genus: **Hoplitis** *Hbn.* (= Hybocampa *Led.*).

Antennae pectinate to $^2/_3$ in both sexes, very long in the ♂ with the branches rather abruptly decreasing, shorter in the ♀ with the branches gradually decreasing, the apical portion serrate. Palpi very short, scarcely reaching beyond the frons. Proboscis vestigial. Eyes naked; ocelli absent. Forewing very elongate in ♂, nearly as in *Exaereta*, but the costal margin rather more strongly curved and the distal margin more evenly and more strongly oblique; in ♀ the forewing essentially broader; vein 5 from centre of discocellulars, 6 together with the stalk of 7, 8, 9 from the upper cell-angle, 10 free, areole absent. Hindwing broad, rounded-triangular, veins 6 and 7 on a long stalk. Hair on thorax and abdomen smooth, on legs long, dense and woolly; hind tibia only with end-spurs. — Larva almost naked, only clothed with very short, thin, but rather dense hair, with 14 feet, the head large, flat, incised above and having a rounded-rectangular outline. Thoracical segment 1 with 2 short obtuse lateral tubercles, abdominal segments 1—6 each with a dorsal process ending in a sharp point, which is directed anad, the anterior process of considerable length, with forked tip, the following ones decreasing in size, on segment 8 a large vertical dorsal process with sharp point, as well as 2 small lateral ones with the point directed backwards; the anal feet replaced by 2 very short points. Pupa short and stout, the anal end broadly rounded, vertex with a short pointed tubercle which is employed in opening the cocoon. The latter oval, flat, of the grey colouring of the tree-trunk to which it is fastened. — Only 1 species is known of this genus.

milhauseri. **H. milhauseri** *F.* (= terrifica *Schiff.*) (45 a). Body grey-brown in ♂, paler grey in ♀, patagia light grey with blackish dorsal edges. Forewing whitish grey, the distal half brownish, the veins being black for the greater part, in the centre an irregular brownish yellow transverse band, which is especially distinct in ♀; at the hind margin 2 large blackish spots, of which the outer one is continued along the transverse band; a similar spot before the middle of the costal margin. Hindwing brownish, whitish in the basal area, and blackish in front of the anal angle. Distributed in Central and Southern Europe, but everywhere rare, not found in England; Spain, Dalmatia, countries around the Black Sea, Amurland, West China and Japan. Also in North Africa, where A. Seitz found the larva on cork-oak; this larva differs from European ones in the tips *umbrosa.* of the processes being lemon-yellow instead of red. — In the East-Asiatic form, **umbrosa** *Stgr.* (45 a), the whole outer half of the forewing is strongly darkened to the costal margin. Japanese specimens also are darker than European ones. — Egg pale brownish, with violet ring below pole. Larva pale yellowish green, minutely dotted with red, abdominal segments 3—7 with whitish red lateral markings and red tubercles. When at rest the apex of the abdomen is held erect. June to August on Oak, also on Elm, Poplar and Birch. Pupa dark brown. The flat cocoons, which are very difficult to perceive, are less hard than in *Cerura* and *Dicranura*; the cocoons are only easily found if they bear a hole, which is said to be made by a woodpecker having eaten the chrysalis; in many instances, however, the hole means simply the exit of the moth. The latter emerges in May or June, comes to the lamp, and rests by day about 1—2 yards above the ground on the trunks of old Oaks.

11. Genus: **Uropyia** *Stgr.*

Antenna in ♂ with rather long pectinations to beyond middle, the apical third shortly serrate, in ♀ the antenna setiform with very short teeth. Palpi small and thin. Proboscis vestigial. Eyes naked. Hair dense and erect on frons and vertex, dense and velvety on middle of thorax. Abdomen $^1/_3$ longer than hindwing. Femora and tibiae densely hairy, hind tibia only with short end-spurs. Forewing elongate, with the apex pointed, the strongly oblique distal margin dentate and as long as the hind margin, with which it forms an obtuse angle. Hindwing broadly rounded. In the forewing veins 3 and 4 rather widely separate, 6 together with stalk of 7, 8, 9 and 10 from upper angle of cell or shortly stalked with them, 10 from the stalk proximal to 7 and connected by a short bar with the stalk of 8, 9 at the point where 8 branches off, a small areole being formed beyond the cell, 8 terminating in the apex of wing. In the hindwing veins 6 and 7 on a long stalk, 8 free. — Larva with oval head, which is deeply incised above in heart-shape, the incision being much deeper than in *Hoplitis,* the body increasing in size to segment 9, the last 2 segments again thinner, on segment 11 a wart-like tubercle; anal fork similar to that of *Dicranura,* but much shorter. — This genus contains only 1 East-Asiatic species.

U. meticulodina *Oberth.* (45 a). An exceptionally beautiful species, with a bright grey-brown ground-colour and characteristic markings. Body grey-brown, the head being somewhat reddish and the centre of the thorax very pronounced dark brown. Forewing grey-brown, with a number of narrow transverse stripes which have pale outer edges, a longitudinal band from base to distal margin dark brown like the back of the thorax, commencing at the base with a nearly black hindmarginal spot, being strongly widened in the centre and occupying the entire marginal area from the hind angle to the costal margin. Hindwing and the whole underside uniformly grey-brown. Ussuri district and Japan. — Larva green, head and thorax red-brown, segment 3 laterally green, the brown colour dorsally continued backward and dilated on segments 6 and 7 sidewards to the stigmata, segments 8 and 9 with narrow brown dorsal spots, 10 and 11 with a large rhomboidal dorsal patch in which there are 2—3 small green spots laterally of the tubercle; anal fork red-brown; segments 9—11 brown ventrally with a light-coloured median line. July and August, on Juglans mandschurica. The pupa hibernates. The moth appears to be rather rare, the larva less so. *meticulodina.*

12. Genus: **Urodonta** *Stgr.*

Antennae pectinate to $^3/_4$, the branches short in ♀, longer in ♂, basal segment with a long projecting brush of hair. Palpi moderately large, not reaching beyond the frons. Proboscis present. — The genus has been separated on account of its characteristic antenna from *Notodonta,* to which it is otherwise closely allied. The larva (of *Urod. albimacula*) likewise resembles those of the species of *Notodonta*; it is cylindrical and bears on the terminal segment a small conical tubercle whose tip is divided into 2 slight small warts. — The genus is restricted to Eastern Asia, and only a few specimens have been obtained of the 4 known species.

U. albimacula *Stgr.* (46 c). Forewing violet-grey to black-grey, with a sharply marked white spot at the apex of cell extending from hind margin forward; 2 subbasal and 2 postmedian parallel transverse lines black, in between them several incomplete black transverse lines and black spots, in front of the centre of the hind margin a whitish spot, which is usually only distinct in ♀; before the paler terminal area a rather obsolescent, only costally sharply defined, slightly dentate white submarginal band. Hindwing brownish grey with paler median band and black anal patch interrupted by several light-coloured lines. The larva (described from a badly preserved specimen) is pale green with a darker or yellowish dorsal stripe and a short reddish double line on the posterior half of the conical terminal tubercle. — Southern Ussuri district (Vladivostok). *albimacula.*

U. viridimixta *Brem.* (= lichen *Oberth.*) (46 c, as *lichen*). Forewing grey, strongly variegated with green, some markings black, at the cell-end a large white spot. Anal angle of the hindwing likewise green. — Amurland and Ussuri (Askold, Suifun, Chabarovsk). The moth found early in June at Oak. Also in Japan. *viridimixta.*

U. branicki *Oberth.* (46 c). Forewing brownish grey, an intensely black spot in the centre of cell and another at the cell-end, between them a black transverse line which runs from the costal margin to the median vein; a row of black postdiscal spots and another of submarginal ones, midway between the rows a single black spot; moreover, some black dots at the costal and hind margins. Hindwing grey-brown with darker anal angle. Both wings with blackish fringe-spots. — Askold, Suifun, Japan. *branicki.*

U. arcuata *Alph.* (49 a). Forewing ash-grey, with sharply marked luniform, light-edged, discocellular spot and several black undulate transverse lines, of which a prediscal one and a postdiscal one are most sharply devel- *arcuata.*

oped; before the margin a dark curved spot extending from the apex to vein 4 and being proximally edged with pale grey, especially so in ♀. Hindwing pale grey-brown with darker distal margin and anal angle. Both wings with blackish fringe-spots. — Southern Ussuri district and Japan.

13. Genus: **Gangaridopsis** *gen. nov.*

The type-species of this genus has only lately been described by Wileman as *Gangarides citrina*, from Japan. However, the insect has nothing in common with *Gangarides* apart from a very superficial and not at all striking similarity in markings and colouring.

Antennae of both sexes with long pectinations, which are only slightly shorter in ♀ than in ♂ and decrease in length only close to the apex; basal segment with a short dense brush of hair. Palpi rather large, obliquely upturned to the height of the frons, end-segment short. Proboscis feebly developed. Eyes hairy. Thorax woolly, with a high, pointed crest of scaling, which is vertical in front. Abdomen smooth-hairy, extending hardly ⅓ beyond the anal angle of the hindwing. Legs with long woolly hair, mid tibia with end-spurs, hind tibia with strong middle and apical spurs. Forewing rather broad, costal margin slight, convex at the base, then almost straight to the apex, the latter pointed, distal margin moderately steep, curved and strongly undulate, gradually curving into the slightly convex smooth hind margin; veins 6, 7, 8, 9 on a stalk from the upper angle of cell, 10 from cell, at point of origin of 7 anastomosing with the stalk of 8, 9, a long narrow areole being formed, in the ♀ before me the fork of 8, 9 so close to the costal margin that it has entirely disappeared in the right wing. Hindwing broadly and evenly rounded; veins 6 and 7 stalked.

The high thoracical crest alone, quite apart from the different wing-contour, is sufficient to distinguish the present genus from *Gangarides*. It does not bear any very close affinity to any other Palearctic Notodontid and is perhaps best placed near *Lophocosma*, from which it essentially differs, however, interalia in the structure of the antennae.

The only known species is

citrina. **G. citrina** *Wileman* (48 h). Head and thorax brownish vermilion, the abdomen more light grey-brown. The brush of hair at the base of the antenna white. Forewing vermilion for the greater part with a slight rust-coloured suffusion, costal margin and a more or less extended area beyond apex of cell light grey-brown; a small white basal dot and 2 larger subbasal dots one above the other at the hind margin of the cell and on vein 1 white, above the anterior dot a small white dash at the anterior margin of the cell; from the costal margin before the apex to the hind margin a nearly straight, narrow, red line which is edged with greyish white on the outer side; an indistinct red subbasal transverse line runs across the white subbasal spots; discal spot likewise somewhat darker than the ground. Hindwing pale grey-brown with a red suffusion. — Japan.

14. Genus: **Lophocosma** *Stgr.*

Antennae of ♂ pectinate with the branches gradually decreasing in length to apex, of ♀ stout setiform; basal segment with a short brush of hair. Palpi upturned to the centre of frons, with a short, truncate end-segment. Proboscis very thin and short. Eyes with short but dense hair. Thorax with an exceptionally large high crest of scaling, which is vertical in front. Abdomen extending ⅓ beyond anal angle of hindwing. Forewing elongate, the apex slightly rounded, the distal margin moderately oblique and slightly curved, the hind margin almost straight. Hindwing nearly semicircular. Distal margin of both wings slightly undulate. In forewing veins 7, 8, 9 stalked, together with 6 from upper angle of cell, 10 from cell, at point of origin of 7 anastomosing for some distance with the stalk of 8, 9, forming an elongate areole. In hindwing veins 3 and 4 from lower angle of cell, 6 and 7 on a long stalk, 8 free. Hair of femora and tibiae very long and dense; mid tibia with short apical spurs, hind tibia with middle and apical ones. — Only 1 East-Asiatic species is known of this genus.

atriplaga. **L. atriplaga** *Stgr.* (46 c). Head, collar and the very high median crest deep dark brown, thorax grey, abdomen grey-brown. Wings grey-brown; forewing light grey along costal margin, with a large, intensely black discal spot which extends to the costal margin and is continued to the hind margin as an indistinct black line; near the base 2 smaller black costal spots, at each of which commences an incomplete blackish dentate line; beyond the discal spot a row of black vein-spots distally edged with white, the row beginning with a costal spot, between this row and the distal margin a diffuse whitish submarginal dentate band. Larva on Corylus and Ostrya. — Amurland, southern Ussuri district (Vladivostok, Askold), Japan, often not rare.

15. Genus: **Nerice** *Walk.*

Antenna of ♂ with moderately long pectinations, these but little shorter in ♀ or the antenna of ♀ setiform. Palpi porrect, reaching above head, with short end-segment. Proboscis vestigial. Thorax with a high crest of scales. Abdomen long cylindrical, extending $^1/_3$ beyond the anal angle of hindwing. Legs rather slender, hind tibia with mid- and end-spurs. Forewing long, but rather broad, the costal margin almost straight, apex slightly rounded, distal margin moderately oblique and curved. Hindwing broadly rounded. — The genus was based by Walker on a North-American species. Since then 3 species have become known from East Asia, all of which agree with one another in an essential characteristic in the marking, a dark longitudinal stripe on the forewing edged with a light tone on the hind side *).

N. davidi *Oberth.* (= bidentata *Leech* nec *Walk.*) (45 b). Forewing dark brown-grey, the distal portion *davidi.* of the costal area light silver-grey traversed by 2 abbreviated blackish transverse bands; the dark ground deepest on the posterior half of the wing, here sharply contrasting with a white longitudinal stripe which runs from the base to the distal margin, the stripe bearing a black spot before and beyond the middle; hind margin again dark. Hindwing grey-brown. — North China, Ussuri district and Japan.

N. bipartita *Butl.* (45 b, as *partita*). Similar to *davidi*, somewhat darker, the forewing divided into 2 *bipartita.* equal halves, the costal half dark, its boundary quite straight; in the broad white longitudinal stripe a rectangular red-brown central spot; in the white costal spot only one dark transverse band. — **upina** *Alph.* (45 b), from *upina.* North China, has a somewhat darker ground, the costal half of the forewing is bounded by an intensely black longitudinal stripe with which the red-brown median spot is merged together; the white colour of the hindmarginal half is reduced to a border of the black longitudinal stripe. — Japan (typical form), North China, Tibet (Amdo).

N. leechi *Stgr.* (45 c). Crest on thorax light red-brown, patagia ashy grey. The whole hindmarginal *leechi.* area of the forewing whitish, only traversed by a narrow blackish transverse band; the dark ground of the costal area has a posterior sharply defined boundary which bears close before the centre a small triangular projection; in this costal area a slightly dentate, narrow, black halfband beyond the middle. Hindwing grey-brown. — Southern Amurland.

16. Genus: **Gluphisia** *Bdv.*

Antennae pectinate to the apex in both sexes, the branches long in ♂, short in ♀. Palpi short, obliquely downturned. Proboscis vestigial. Eyes naked, ocelli present. Hair on thorax and legs dense and long, on abdomen short. Hind tibia with end-spurs only. Forewing rather broad, with the distal margin moderately curved, hind angle not sharply defined; no areole; vein 6 together with stalk of 7, 8, 9, 10 from upper angle of cell. Veins 6 and 7 of hindwing on a very long stalk, the free portions of these veins only about half as long as the stalk. — Larva naked, only bearing very few minute hairs, smooth, without tubercles, with 16 feet. Pupa short and stout, with round anal end, flattened dorso-ventrally. — In Europe this genus is only represented by a single species, which occurs nearly throughout the Palearctic Region. A second species has only lately been described from Japan; several species in America.

G. crenata *Esp.* (= crenosa *Hbn.*) (46 d). Ashy grey. Forewing with a blackish transverse band before *crenata.* and another beyond the centre, the former almost straight, the latter dentate and distally pale-edged; the area between the two bands often darkend in the ♀; a submarginal dentate band proximally light-edged. Central Europe, sporadical and rare, occurring as far as Southern Scandinavia and North Italy, Bukovina, South Russia. April, May. — The East-Asiatic form, from the Amur and Ussuri districts, which we call **amurensis** *amurensis.* *Stgr. i. l.* (46 d), is darker, blackish grey, with the light edges to the postdiscal and submarginal bands sharper. — Larva bright green, with yellow glossy head, two dorsal longitudinal lines whitish, between them a vivid dark red spot on thoracical segments 2 and 3 and on abdominal segments 3 to 9. June and again in the autumn on species of Poplar, lives and pupates between leaves spun together. Pupa black-brown, feebly glossy.

G. japonica *Wileman.* Body dark brown. Forewing grey-brown with light discal spot; subbasal band *japonica.* as well as a pre- and postdiscal one sharply marked, blackish, edged with light grey, dentate or undulate; a pale submarginal suffusion. Hindwing rather lighter than the forewing, with a pale double median band. — Japan (Yezzo).

17. Genus: **Drymonia** *Hbn.*

Antennae of ♂ with rather long pectinations to the apex, of ♀ simple, setiform, only bearing short bristles on the underside. Palpi short, hardly reaching above the hair of the frons. Proboscis vestigial. Eyes naked;

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*) In connection with this genus we figure a species of *Noctuidae* which Leech had placed with the Notodonts as *Edema nivilinea.* This species, however, is identical with Oberthuer's *Dichagyris jankowskii*, which is separated by Staudinger und Rebel as *Stenoloba.* The insect is dealt with vol. 3, p. 273 of this work and its ♂ figured, l. c., plate 51, l.

ocelli absent. Forewing rather broad, the distal margin oblique, moderately curved, united in a curve with the hind margin, the latter straight, usually smooth and without a tooth of scales, or this tooth only feebly developed; vein 6 together with the stalk of 7, 8, 9, 10 from the upper cell-angle or 6 from the stalk of 7—10; usually no areole. Hindwing broad, distal and abdominal margins evenly rounded; veins 6 and 7 on a very long stalk. Hair long on thorax and legs, short on abdomen. Hind tibia with mid- and end-spurs. — Larva elongate cylindrical, similar to Noctuid larvae, naked, bearing only dispersed, single, minute hairs, smooth and without tubercles, as far as known green with coloured lateral stripe; 16 feet; two broods. Pupation on or in the ground. Pupa with spinose anal end. — A relatively large number of species of *Drymonia* are known from the Palearctic Region, the greater proportion, however, being restricted to East Asia, no less than 8 occurring in Japan. The scheme of markings of all the species is characterised by the presence of a pale or dark, simple or double prediscal dentate band and a similar postdiscal one.

vittata. **D. vittata** *Stgr.* (= streckfussi *Honr.*) (45 f). Light brownish grey. Forewing with a distinct hindmarginal tooth of black scales and a sharp black longitudinal band in the posterior half, commencing at the base, running parallel with the hind margin and being forked before the distal margin; veins black in the distal marginal area. Both wings with diffuse black fringe-spots. Underside whitish grey. — Carniolia (Wippach), end of May, Southern Asia Minor (Taurus). Hitherto only a few specimens known, the species being one of the rarest Lepidoptera of Europe. Early stages still unknown.

lineata. **D. lineata** *Oberth.* (45 d). Thorax ashy grey, collar and patagia with black edges, abdomen browngrey. Forewing with broad obtuse tooth at hind margin, dark ashy grey, with 2 parallel black oblique bands before the middle, sharp black discal spot which is continued as a blackish band, a black postdiscal band which forms an angle of 90° at vein 4 and is strongly curved posteriorly, the anterior portion being surrounded by a broad whitish shade; a diffuse submarginal band sharply dentate. Hindwing whitish grey. — Southern Ussuri district and Japan.

querna. **D. querna** *F.* (45 e). Body and forewing dark grey-brown, the latter with a slight reddish violet tone and sharply marked white lunule at apex of cell; before and again after the centre a black transverse line, the proximal one straight and only in front of hind margin curved outward, the distal one dentate with white edge, from which extend short black vein-streaks towards the margin; a light submarginal line undulate. Hindwing white in ♂, of a brownish tint in ♀. Sporadical in Central Europe; Portugal, North Italy, Dalmatia. Absent from England. — Larva green, with numerous minute whitish spots and approximated whitish subdorsal lines; on a level with the black-margined spiracles a red-edged longitudinal stripe which is interrupted at the segmental incisions; head greenish. May-June and August-October on Oak-bushes. Pupa black, in the ground in a cell lined with silk.

nigroramosa. **D. nigroramosa** *Christ.* (49 d). Light grey-brown, forewing with 2 sharp black transverse dentate lines, the prediscal one being vertical and the postdiscal one white-edged on the outer side and anteriorly broadly excised on the inner side; in between the bands a large white spot in front of the hind margin; dark spots at the extremities of the veins. Hindwing white in ♂ with brownish distal margin, entirely brownish in ♀. — Southern Transcaspia (Tekke, Nuchur).

manleyi. **D. manleyi** *Leech* (45 d). Forewing whitish grey, with numerous dispersed brown scales and a dark chocolate transverse band before as well as beyond the centre, the proximal band the broader one, vertical and intense in colour, the postdiscal one narrow, dentate and strongly excurved beyond the cell; a large dark hindmarginal spot between base and first band. Hindwing grey-brown with narrow dark median band. — Japan: at Yokohama in September and October not rare at the light, presumably also early in summer.

trimacula. **D. trimacula** *Esp.* (= dodonaea *Frr.*) (45 f, as *dodonaea*). Forewing whitish grey, with 2 black basal dots, a broad transverse band which is constricted in the middle and proximally edged with blackish scaling, and a distal dark dentate band which is broad at the costal margin, tapers to the hind margin and forms an intensely black-brown angle-mark on vein 2; distal margin with sharp dark brown spots. Hindwing greybrown. *albida.* The scheme of markings of the forewing somewhat recalls *Cerura*. ab. **albida** *Rebel* belongs to true *trimacula*; the whole median area of the forewing is uniformly white apart from the two bands. — In the southern *dodonaea.* districts predominates a uniformly darker coloured and usually somewhat smaller form, **dodonaea** *Hbn.* (45 d, as *trimacula*), ground-colour blackish grey-brown, only the outer half of the median area forming a white band, which is traversed by a blackish line accompanying the outer dark band. The extreme of this form is represented *fusca.* by ab. **fusca** *Rebel*, in which the forewing is uniformly black-grey without markings. — Central Europe eastward to Moscow, the Carpathian and the Transsylvanian Mts., North and Central Italy, Greece, Armenia, Eastern Asia, Ussuri district and Japan. — The form which represents the species in Eastern Asia, the *dodonides.* southern Ussuri district and Japan, **dodonides** *Stgr.* (45 e), likewise differs from *dodonaea* in the uniformly darker colouring; moreover, the outer transverse band and the proximal edge of the inner one are essentially more deeply dentate. — Egg pale greenish, minutely punctured. Larva glossy light green, with 2 dorsal whitish longitudinal lines and a yellow stripe on a level with the spiracles, the stripe often spotted with red in full-fed specimens. June—August, on Oak and Birch, during the day concealed in the crevices of the bark. Pupa black-brown, with 4 small hooks at the anal end; in a silk-lined cell in the ground. — In Southern Germany and further south the species has two broods, the larva being full-grown in June and October; moths from hibernated pupae are met with very early in the year, often already the end of April and in May, the second brood being on the wing in August. Abundant in most districts; larvae most frequent on old Oaks.

chaonia. *grisea.* *lunula.* **D. chaonia** *Hbn.* (= ruficornis *Auriv.*) (45 e). Thorax greyish brown to light grey, abdomen light brown. Forewing dark grey-brown, the dark pre- and postdiscal zigzag bands as in *querna*, but closer together, particularly at the hind margin, edged with white on the proximal and distal sides respectively; the median area between the transverse bands paler grey, bearing a sharp black luniform discal spot; in the marginal area a whitish undulate line, which is frequently obsolete. Hindwing light grey-brown. In the southern districts, from southern Central Europe southward, a uniformly darker form predominates, **grisea** *Turati* (45 e), in which the median area of the forewing is also darkened. Another form, which we call ab. **lunula** *ab. nov.* (45 e), is intermediate between *grisea* and true *chaonia*; the whitish colour is restricted to the outer half of the median area beyond the cell and usually interrupted in the centre into a costal and a hindmarginal patch. This aberration likewise belongs to the southern districts. — Europe, northward to Denmark and Livonia, southward to Southern Italy and Sicily, Dalmatia, Southern Russia, Asia Minor, Armenia; also in Japan. Egg green. Larva pale green, with 4 equidistant chrome-yellow longitudinal lines, of which the 2 dorsal ones are sometimes whitish, the lateral ones on a level with the black-edged spiracles. May to July on Oak, when at rest always on the underside of the leaf along the midrib. Pupa black-brown, with lighter segmental incisions; in the ground in a cell lined with silk. Moth in April and May, in the South again in August. Even more abundant than the preceding species.

delia. **D. delia** *Leech* (45 d). Forewing grey with a brownish tone, the median area silvery grey, only the costal margin being darker; a subbasal, a pre- and a postdiscal black double band, the first sharply broken in the centre, the second straight, directed obliquely back- and outwards, the third strongly undulate; at the margin a black lunate line. Hindwing olive-brown. — Japan.

circumscripta. **D. circumscripta** *Butl.* Ground-colour of forewing white, densely dusted with brown and grey scales; basal third pale green, distally bounded by a white proximally black-edged undulate line and interrupted by a white band which extends from the costal to the hind margin and is traversed by a red-brown line; discal spot white; beyond the cell a large olive-green patch, which reaches to the costal margin, extends to apex in the shape of a very irregular streak and bears in its outer half two black dentate lines enclosing 5 white dart-spots; the outer one of these two lines forms the proximal edge of the apical streak; in the marginal area a strongly curved white submarginal band, the margin itself somewhat darkened. Hindwing greyish brown, with a paler median stripe. — Japan.

permagna. **D. permagna** *Butl.* Forewing slate-grey, semitransparent; the base, hind margin and a discal dentate band sap-green; the usual pre- and postdiscal bands slightly darker than the ground and only feebly developed, each accentuated by a yellow spot at the hind margin; on the green discal band likewise 2 yellow spots; discocellular vein black, beyond the cell a white costal spot, a larger one at the apex; margin dark brown spotted with yellow. Hindwing greyish brown, with a slightly curved whitish median band which ends at the anal angle in a large sulphur-yellow spot which is edged with black proximally as well as distally, at the outer black edge a small patch of blue scales. — Japan.

eximia. **D. eximia** *spec. nov.* (45 d). Exceptionally bright-coloured and large for this genus. Ground-colour of forewing white, somewhat toned down by dispersed black scales; a large blackish brown basal patch does not quite reach the base and extends a little beyond the white prediscal band; the postdiscal band, which is less prominent, is contiguous with a large dark subapical patch which occupies the whole costal area to near apex; the dark discal spot distinct; near the margin a black lunate line. Hindwing dark greyish brown. — Japan.

mandschurica. **D. mandschurica** *Oberth.* (49 b). Thorax and forewing bluish grey. Forewing with a whitish basal spot, the prediscal band indicated by a whitish spot at the costal and hind margins, the postdiscal band also only represented by some pale spots; fringe light-spotted. Hindwing yellowish grey. — Manchuria (Sidemi).

18. Genus: **Pheosia** *Hbn.*

Antennae pectinated to the apex, the branches rather long in ♂, short in ♀, the basal segment of ♂ with a tuft of hair. Palpi very short. Proboscis vestigial. Eyes naked; ocelli absent. Forewing long and narrow, apex rather pointed, distal margin strongly oblique, forming an obtuse angle with the hind margin, the latter curved, bearing a tooth of scales in the centre, vein 6 from upper angle of cell together with stalk of 7, 8, 9, 10; no areole. Hindwing broad, the anal angle slightly prominent, veins 6 and 7 on a long stalk. Thorax with long and dense, but smooth hair, the legs likewise long-hairy, the hair on abdomen shorter. Hind tibia with mid- and end-spurs. — Larvae elongate-cylindrical, smooth and as glossy as porcelain, bearing only dispersed minute hairs; 16 feet; on abdominal segment 8 a broad pyramidal tubercle which ends in a short point; head broad and flat. Pupa in the ground in a silk-lined cell, slender, cylindrical, with a short bifid fork at the anal end. —The genus is holarctic and extends southward to India and California. The area of distribution of the two species found in Europe reaches to East Asia, two other species being found in Central Asia, while a fifth from the southern Himalayas connects the Palearctic and Indian faunas.

tremula. **P. tremula** *Cl.* (= dictaea *Esp.*) (45 f). Head and thorax grey or predominantly brown, abdomen greyish brown. Forewing whitish, brownish at the margins, beyond the middle of the costal margin 2 black longitudinal smears, which often merge together in the shape of a band, a black longitudinal line in front of the hind margin from the base to the distal margin; below vein 1 a long white wedge-spot extending to the distal margin, its distal end being filled in with a dark colour; apical portions of veins 2—4 white. Hindwing whitish, blackish along anal angle, within this black colour a narrow white marginal line. — Throughout Central Europe, northward to the Baltic provinces of Russia, southward to Northern Spain, Central Italy, Southern Russia, Armenia; also in Amurland. Egg moderately convex, minutely punctate, light green or yellowish green. The larva in two colour-varieties: either glossy light green with whitish dorsum, red-brown transverse bar on the tubercle, orange-yellow longitudinal line below the spiracles and red stigma-spots, or uniformly brown-red. In both varieties the stigmata are black with white border. June to October on species of Populus and Salix, also on Birch. Pupa dark brown, in the ground in a hard cell lined with silk. Moth plentiful everywhere, in May and July—August. In the North only one brood.

dictaeoides. **P. dictaeoides** *Esp.* (? = gnoma *F.*) (45 f). Very similar to *tremula*, usually somewhat smaller, the white wedge-spot below vein 1 of the forewing shorter and entirely white, without dark scaling in it. Anal angle of hindwing brownish without white marginal line. In the Higher Alps occurs a dark form of this species, *leonis.* ab. **leonis** *Stich.*, which is scarcely distinguishable from the Arctic form **frigida** *Zett.* (45 f) from Lapland, in which *frigida.* the wedge-spot of the forewing is grey instead of white. — Throughout Central Europe, northward to Lapland, southward to Southern France, Northern Italy, Croatia, and the Bukovina; East Asia (Amurland). Egg at first whitish green, becoming gradually darker, being finally grey like poppy-seeds. Larva dark brown-red or bright light green, glossy, with blackish transverse bar on the tubercle and broad orange-yellow lateral line, at the upper edge of which the white-edged black stigmata are placed; on the underside a similar yellow longitudinal stripe. July to September on Birch. Pupa dark brown. Moth in 2 broods, May—June and again in August. In the North only one brood.

fasciata. **P. fasciata** *Moore* (49 a). Body predominantly grey. Forewing whitish grey, more or less extended brownish, with dark brown longitudinal stripes below the outer half of the distal margin and below the cell, the hind margin also being dark brown; fringes of both wings with dark spots. Hindwing whitish, with dark brown anal angle and narrow brown edge. — Kashmir (Dharmsala), and North India. Larva light green, with a dorsal row of red spots, which are largest on segments 7—11 and sometimes merge together to form a red-brown stripe from segment 4; this segment with dorsal tubercle; head striped with dark red; legs light red.

buddhista. **P. buddhista** *Püng.* (49 c). Thorax grey, with dark transverse band, abdomen greyish brown. Forewing as in *tremula*, but somewhat broader, the light (yellow) basal spot situated below the sharply white-edged black longitudinal stripe broader, the projection of dark scales of the hind margin larger; the black longitudinal smear below costal margin interrupted in the centre and from its proximal end an obsolescent, feebly dentate, dark line runs to the hind margin; beyond this line to the apex the wing is paler in colour, the distal margin being darker. Hindwing greyish brown, the anal angle darkened and proximally bounded by a pale tint. — Tibet (Amdo).

tephroxantha. **P. tephroxantha** *Püng.* (49 b). Closely related with *P. buddhista*. Forewing yellowish grey, lighter beyond the postdiscal band, some black costal dots before the apex; the hind margin with a pale edge from the base to the tooth of dark scales, the distal marginal area bounded by black. Hindwing yellowish white, with darkened hind margin. — Turkestan (Kuku-Nor).

jullieni. **P. jullieni** *Oberth.* (49 d). Very close to *tephroxantha* (= ♀ of it ?). Thorax and forewing ashy grey, abdomen brownish, antenna light ochreous brown. Forewing dusted with black scales, without distinct prediscal band, a black basal longitudinal streak posteriorly edged with white; postdiscal band black, sharply dentate, beyond the middle a long black subapical spot interrupted by some white costal dots; marginal line black. Hindwing pale brownish grey, edged with black at the anal angle. —East Turkestan: province of Semirechinsk.

19. Genus: **Hupodonta** *Butl.*

Its nearest relatives are *Pheosia Hbn.* and *Notodonta O.*; the forewing broader and without tooth of scales at the hind margin. Pectinations of ♂-antenna essentially longer. — Oriental Region and East Asia.

H. pulcherrima Moore, a species from Southern Asia whose name-typical form has not yet been recorded from Palearctic territory. — On the other hand, **corticalis** *Butl.* (45 g) inhabits the southern Ussuri district and Japan. It differs from *pulcherrima*, apart from its lesser size, in the paler colour of the body and the much paler forewing with much less prominent markings; only the blackish brown, distally pale-edged, submarginal band and the black line beyond it are usually sharply expressed. In Japan occurs a second form of this species, which we call **stigmatica** *ab. nov.* (45 g); the forewing is strongly darkened, the ground-colour being almost uniformly grey-brown, the dark-edged white discal spot being very prominent; also the submarginal line is less well-developed as is usually the case in *corticalis*. *corticalis.* *stigmatica.*

20. Genus: **Microphalera** *Butl.*

Antenna of ♂ serrate and plumose, tuft-like. Palpi scarcely extending beyond the hair of the frons, densely hairy. Proboscis feebly developed. Eyes naked; ocelli absent. Thorax with a vestigial, short and obtuse crest between the patagia; abdomen with a strong tuft of hair on the basal segment. Legs with long and dense hair, hind tibia with long mid- and end-spurs. Forewing elongate, with pointed apex, distal margin strongly oblique, little convex, hind angle sharply marked; hind margin slightly curved in proximal half, without distinct tooth of scales; veins 6—9 stalked, the stalk thrown off from upper angle of cell, 10 anastomosing with stalk of 7, 8, 9 and forming a long areole. Hindwing broad, evenly rounded, veins 6 and 7 on a short stalk.

M. atrovittata *Brem.* (= insignis *Butl.*, Notod. toddii *Holl.*) (45 f). Body and hindwing dark greyish brown, thorax with black transverse band. Forewing with a grey-brown ground, partly more greenish grey, particularly at the costal and hind margins (rather too light in our figure); an intensely black longitudinal streak below the cell from the base to the distal margin; pre- and postdiscal dentate black bands broken in centre and only distinct anteriorly, the postdiscal one distally with pale edge; in the marginal area a black streak between veins 4 and 5, at the margin wedge-shaped black spots on the veins. — Ussuri district and Japan. *atrovittata.*

M. grisea *Butl.* Forewing white, light brownish in places, irrorated with black scales; in the median area there are 4 blackish lines placed in pairs and commencing at the costal margin, the two central ones being band-like, irregularly dentate, and approximated below the cell; in the cell a black longitudinal streak, beyond the cell 4 similar streaks in zigzag; distal margin spotted with black. Hindwing dirty white, with a moderately broad pale brown border. — Southern Ussuri district and Japan. *grisea.*

M. alboaccentuata *Oberth.* (48 f). Ground-colour of wings dark grey-brown; forewing with a black longitudinal streak in the cell and two sharply marked long black submarginal spots, which might be considered a submarginal band interrupted in the centre; a conspicuous, sharp, white angle-spot beyond the middle of the hind margin close to the posterior submarginal spot; along the distal margin black internervular spots, at the costal margin the beginning of a postdiscal dentate band, which terminates at the hind margin with the white spot mentioned; at the apex of the cell a black transverse bar with a narrow pale border. Hindwing uniformly grey-brown. — Ta-tsien-lu. *alboaccentuata.*

21. Genus: **Notodonta** *O.*

Antennae pectinated to the tip in the ♂, the branches moderately long and strongly decreasing in length in the apical third, in ♀ only serrate; basal segment of ♂ with a tuft of hair. Palpi short, not reaching beyond the hair of the frons. Proboscis vestigial. Eyes hairy; ocelli absent. Hair of body and tibial spurs as in *Pheosia*, thorax without crest of scales. Forewing somewhat less elongate and broader than in *Pheosia*, the apex a little more rounded, distal margin strongly oblique, forming an obtuse angle with the hind margin, the latter with a strong tooth of scales; neuration as in *Pheosia*, no areole. Outline and venation of hindwing likewise as in *Pheosia*. — Larvae smooth and almost without hair, with 16 feet; with the exception of *N. anceps*, whose larva has no hump, they bear (as far as they are known) on segments 2 to 4 a process strongly directed backwards and a more pyramidal one on abdominal segment 8. At rest they keep the head- and tail-ends raised, like the larva of *Stauropus*; but *N. anceps* is an exception also in this respect. The caterpillars feed on deciduous trees, pupating on or in the ground. Pupa rather stout, the tail-end with 2 points or rounded.

The Palearctic fauna contains 22 species; 6 of them are found in Europe, all occurring also in Eastern Asia, with the exception of *N. tiefi*, which so far is only known from the Ural. The species of *Notodonta* exhibit a rather great variety in markings, but in most species, as in *Drymonia*, we find distinct pre- and postdiscal dentate bands.

N. dromedarius *L.* (= zebra *Don.*, perfusca *Haw.*) (46 a, 56 d). Forewing pale brownish grey to dark grey-brown, with light-edged dark brown pre- and postdiscal dentate bands, the dark discal spot likewise pale- *dromedarius.*

edged; marginal area more or less distinctly rust-brown around a dark longitudinal streak, the rather broad submarginal band also bright rust-brown. Hindwing grey-brown or predominantly grey. In specimens whose ground-colour is faded on account of age or is not properly developed, the bright markings are very prominent, as in our figure on Pl. 46 a. On the other hand, quite fresh specimens are almost uniformly black-brown, being so dark that the markings are hardly visible. Such a specimen is represented on Pl. 56 d. — Central Europe, northward to Esthonia and Livonia, southward to Catalonia and Northern Italy; Armenia; according to Graeser also in Amurland. — Larva yellowish green or brown-red, in both cases with a dark red-brown dorsal stripe from head to abdominal segment 4; segments 1—4 of abdomen each with a large dark red-brown tubercle; an interrupted dark longitudinal marking laterally above the legs. July—August on Willow, Birch, Hazel and Alder. Pupa black-brown, in a cell in the ground. Moth May—June and July—August. Some of the pupae of the summer-brood hibernate. In the Baltic provinces only one brood.

ziczac. **N. ziczac** *L.* (45 g). Basal half of forewing light yellowish brown, the central costal area white-grey in between a dark transverse line and the large arcuate black discal spot, beyond the discal spot a broad dark cloud distally bounded by a pale dentate line; in the marginal area a slightly undulate dark submarginal line distally pale-edged and curving basad below costal margin in the shape of a black longitudinal stripe; marginal line and hind margin black. Hindwing paler or darker greyish brown. The black markings of the forewing sometimes dark brown, but never paler. Central and Northern Europe, southward to Spain, Corsica, Central Italy, northern parts of Asia Minor. According to Graeser also in Amurland. — A pale form with the ground- *pallida.* colour of the forewing ochreous instead of brown has been obtained in Central Asia: **pallida** *subsp. nov.* (45 g). — Egg green. Larva pale red to violet, with a strong tubercle on abdominal segments 2 and 3 and a dark dorsal line commencing at the head as in *N. dromedarius*; both the tubercle and the dorsal stripe are edged with white; dark specimens moreover, have white spots and oblique stripes on the back, as well as a white side-line on a level with the spiracles, the line being especially distinct on the thorax; head narrow and high, rather deeply incised at the vertex. June—July and August—October, on Popuuls and Salix. Pupa dark brown, with two anal points, in a hard cocoon in or on the ground. Moth in 2 broods, April—May and July—August. In the North only one brood.

jankowskii. **N. jankowskii** *Oberth.* (46 a). Similar to *N. dromedarius*, but larger. The ground-colour of the forewing is a lighter grey, the two dentate bands are less prominent, the red-brown markings are pronounced red and more sharply developed, especially the discal spot; the tooth of scales at the hind margin blackish grey. Antenna of ♂ only with short cilia. — Amurland and Ussuri district. Moth end of July.

dembowskii. **N. dembowskii** *Oberth.* (45 g). Likewise allied to *N. dromedarius*, somewhat larger, forewing light brownish grey, the hind margin pale yellow between the two dentate bands, a similar light spot at the costal margin beyond the outer transverse band; discal spot sharply defined, black with whitish border; basal area at hind margin and the submarginal band reddish. — Ussuri district, Askold, Amurland, Japan. Moth early in July, larva on Birch.

graeseri. **N. graeseri** *Stgr.* (46 a). Distinguished by the ♂-antenna being only shortly pectinated and the strongly incurved basal portion of the hind margin of the forewing. This wing grey with yellow basal spot bounded by a dark double line; the prediscal band double and very prominent, the postdiscal one simple; discal spot small and not standing out much; at the commencement of the submarginal band a dark costal spot. Hindwing whitish, brownish at anal margin, with a strongly abbreviated dark submarginal band. — Ussuri district; Japan.

aliena. **N. aliena** *Stgr.* (46 a). Closely related to *N. graeseri*; the ♂-antenna as in that species, the hind margin of the forewing still more strongly incurved; the basal dentate band of the forewing distinct, the prediscal one strongly curved outward beyond the cell, closely approaching the postdiscal band; the light-bordered dark discal spot distinct; the entire basal area, as far as the prediscal band, with the exception of the costal margin, is occupied by a reddish yellow patch which bears broad dark brown longitudinal clouds. Hindwing with a broad dark band. — Ussuri district; Japan.

arnoldi. **N. arnoldi** *Oberth.* Nearly allied to *N. graeseri* and *aliena*, especially to the former. Ground-colour of forewing reddish grey-brown, the costal area more grey, the basal patch reddish, the basal and prediscal dentate bands, the discal spot, and the postdiscal and submarginal bands red-brown, the submarginal band placed as in *graeseri* and likewise pale-edged on the distal side; a dark subapical spot at the last third of costal margin. Hindwing yellowish brown, with a sharply defined blackish transverse band and black marginal line. — Manchuria.

anceps. **N. anceps** *Goeze* (= trepida *Esp.*, tremula *Hbn.* nec *Cl.*) (46 b). Attaining a considerable size, particularly in the ♀. Forewing greenish grey, usually lighter (whitish grey) in the anterior half of the discal area and at the submarginal band, with a basal, pre- and postdiscal black dentate band, which are sometimes rather obsolescent; the light-edged dark discal spot prominent; the submarginal band composed of dark brown dashes and spots. Hindwing whitish grey or brownish grey. — In Europe from the North to Spain, Corsica, Central Italy, Southern Russia; also in Armenia, and (according to Graeser) in Amurland. Egg greenish white. Larva stout, cylindical, smooth and without tubercles, yellowish green, with 4 dorsal sulphur-yellow longitudinal lines, the lateral ones being separated into spots; moreover, with yellow, posteriorly red-bordered oblique stripes on the abdominal segments extending from the stigmata forward and upward; on thoracical segments 1 and 2 a red-bordered yellow longitudinal stripe which runs to the mandibles forming a kind of bridle, to which the larva ows its German name of ,,Golden Mouth". June—September, on Oak. Pupa deep black-brown, with obtuse anal end, in the ground in a cell slightly lined with silk. Moth the end of April until June, in one brood only. Everywhere, not rare.

monetaria.

N. monetaria *Oberth.* (46 b). Similar to *N. anceps* in size and markings, but the ground-colour darker, more brownish grey. The dentate bands, especially the postdiscal one, often rather weak; the median costal area rather extended whitish grey; the dark discal spot sometimes entirely absent, but even in this case its light border distinct. Hindwing greyish brown, with a narrow discal dentate band on a whitish ground, also the anterior marginal area whitish. The ♂-antenna with short teeth and bearing penicillate cilia. — Amurland and Ussuri district; Japan.

oberthueri.

N. oberthueri *Stgr.* (46 b). Similar to *N. monetaria*, smaller, the ♂-antenna likewise dentate and bearing penicillate cilia. Forewing with a smaller tooth of scales, brownish grey, the median area between pre- and postdiscal bands entirely or for the greater part of a lighter tone; the submarginal band, composed of blackish spots, is sometimes quite obsolete. Hindwing similarly marked as in *N. monetaria*, but the margin somewhat more strongly dentate. — Ussuri district.

phoebe.

N. phoebe *Sieb.* (= tritophus *Schiff.*) (45 h). Ground-colour of forewing yellowish grey-brown, the basal area to near the prediscal band as well as the outer half between cell and costal margin extended black-brown, the median costal area light grey; discal spot light brown with a whitish border: the submarginal undulate line dark brown, the distal edge and the fringe black-brown. Hindwing whitish or slightly brownish, blackish at the anal angle. — Throughout Central Europe, northward to Southern Sweden, Livonia, and Northern Russia, southward to Southern France, Northern Italy, Bukovina; Armenia. Egg moderately convex, whitish green. Larva dirty white-grey, greenish or brown-red, similar to that of *N. ziczac*, with tubercles on abdominal segments 1—5, the first tubercle and the last being but small, while the other three are large, curved backward and dark brown-red; on segment 8 a conical hump. June—July and September, on Poplar, Birch and more rarely Salix. Pupa glossy dark brown, with several small hooks at the tail-end, in a cell in the ground.

moltrechti.

N. moltrechti *Oberth.* (49 b). Forewing dark reddish grey-brown, the costal margin grey to beyond middle; at the base a large black spot bordered by a black arcuate line; the postdiscal band only indicated by a row of short black vein-streaks; a pale spot in the cell. Hindwing pale brownish grey, with black marginal line and a slight trace of a dark transverse band in the costal half. — Manchuria.

tritophus.

N. tritophus *Esp.* (nec *Schiff.*; = torva *Hbn.*) (46 a). Forewing evenly dusted with dark brown and yellowish scales, which gives the wings a greenish grey appearance; pre- and postdiscal dentate bands rather prominent or somewhat obsolescent, pale-edged on the proximal and distal sides respectively; discal spot black-brown, with yellowish border, submarginal line diffuse; fringe with dark spots. Hindwing pale grey-brown, the anal angle darkened. Two darker, but rare, forms are known of this species, ab. **fuegei** *Bartel* with black abdomen and blackish forewing bearing white transverse stripes (so far only known from Saxony), and ab. **melaena** *Spul.* which bears on the likewise blackish forewing only very feeble traces of dentate bands, but has a pale undulate band in the marginal area. OBERTHÜR has lately figured a uniformly dark grey-brown form from Manchuria, **uniformis** *Oberth.*, in which the prediscal band is entirely absent and the postdiscal one weak and diffuse, the discal spot has a whitish border, and there is a light-edged dark submarginal line. Hindwing paler, more grey, with whitish median band. — Central Europe, as far as Sweden and Northern Russia, southward to Central Italy, Bukovina; also Amurland and Ussuri district, as well as Japan. The larva very closely resembles that of *N. ziczac* and is easily confounded with it. There are scarcely any apparent differences in colour and markings, but the colouring appears on the whole to be a little deeper in tone. The tubercle on abdominal segments 2 and 3 are somewhat shorter and obtuser. June—July and August—September on Poplar and Birch. Pupation in the ground beneath fallen-off leaves. Moths in May—June and August: far less abundant than most other species of *Notodonta*.

fuegei.

melaenia.

uniformis.

tiefi.

N. tiefi *Bartel* (45 h). Allied to *N. phoebe Sieb.* The ground-colour a pale yellowish grey, the very dark colouring in the basal area and beyond the cell less extended, the postdiscal dentate band distally prominently edged with white followed by a row of dark spots; discal spot yellowish brown with a whitish border. Hindwing white, anal angle darkened. — Southern Ural (Orenburg); also Finland. Moth in June and July. According to OBERTHÜR only an albinotic form of *N. phoebe*. However, an albinotic form is known of *tiefi* itself, which we call ab. **obsoleta** *ab. nov.*, and which bears only traces of the dark markings on the forewing.

obsoleta.

basistriga.

N. basistriga *Moore* (49 a). Forewing yellowish grey, median and marginal areas palest, pre- and postdiscal dentate bands prominent, blackish brown, the basal area as far as the prediscal band and the area beyond the postdiscal one darkened; a distinct dark oblique subbasal band; discal spot pronounced blackish brown; the dark submarginal band separated into single spots; along the distal margin another row of blackish spots. Hindwing whitish grey, darker, i. e. brownish, in the ♀. — Dharmsala in the Western Himalayas.

gigantea. **N. gigantea** *Butl.* (46 b). Besides the large size and the broad forewing easily recognized by the dark ground-colour and the large yellow costal spot on the forewing. This wing blackish grey or more brownish, with a yellow subbasal band and a large yellow spot in the middle of the costa extending beyond the apex of cell; beyond the middle a whitish costal spot. — Japan.

grummi. **N. (?) grummi** *Christ.* (49 c). Forewing grey, without tooth of scales at the hind margin, with a blackish dentate band close beyond apex of cell and a postdiscal transverse row of black vein-dots; fringe likewise with black dots. Hindwing whitish, the anal margin blackish. — Transcaucasia (Ordubad). Only the ♀ known. It is doubtful if the species belongs to *Notodonta*.

cinerea. **N. cinerea** *Butl.* Represents in Japan the Oriental *N. moorei Hamps.*, which is figured in vol. X. Forewing and thorax ashy grey, discal spot as well as the other markings pure white. — Japan.

trachitso. **N. trachitso** *Oberth.* (49 a). Size as in *N. tritophus.* Forewing brownish grey with a slightly slaty tone, the markings dark red-brown or chocolate, viz., the prediscal band diffuse, the postdiscal one and the rather broad submarginal band sharply defined, discal spot very dark brown with light edge. Hindwing grey, the marginal half lighter, yellowish, with a dark submarginal band. — Tibet; Japan.

pira. **N. (?) pira** *Druce.* Head and thorax grey-brown, adomen pale grey. Forewing dark greyish brown, beyond the centre with a pale grey transverse band which is divided near apex of wing by a dark brown spot; marginal line black, fringe dark brown. Hindwing dull whitish, apex and distal edge darkened. — Central China (Hunan).

lativitta. **N. lativitta** *Wileman.* This and the nest species, which are unknown to us, have only lately been described. Body greyish brown, collar and patagia with blackish edges. Forewing light grey-brown, variegated with whitish scaling, a broad reddish yellow longitudinal stripe on the posterior half; subbasal, pre- and postdiscal dentate bands dark brown, especially pronounced at the costal margin; near the margin a row of dark brown submarginal spots placed in a broad whitish stripe which commences at the apex; discal spot brown with whitish border, above it a black-brown costal spot; marginal line dark brown. Hindwing whitish, inner margin brownish to near apex, anal margin yellowish. — Japan (Hondo).

basilinea. **N. basilinea** *Wileman.* Like the preceding insect only lately described. Body and forewing dark greyish brown; subbasal and prediscal dentate bands black, distinct only in the anterior half, edged with yellowish brown on the distal and proximal sides respectively; postdiscal band more distinct, black, running in a curve to the tooth of scales of the hind margin, and edged with a yellowish tone on the outer side; the distal area of the wing extended yellowish brown, traversed by the black veins; the veins are also blackish in the basal half; discal spot dark, with yellowish border; fringe with blackish spots at the vein-tips. Hindwing light grey-brown, dark at the apex, traversed by a whitish dentate band, marginal line and marginal spots dark brown, anal margin likewise darkened. — Japan (Hondo).

22. Genus: **Semidonta** *Stgr.*

Closely related with *Notodonta* and the following genus *Allodonta*; differs from the former in the thorax bearing an erect crest of scales, and in the markings of the wings, and is distinguished from *Allodonta* by the ♂-antenna being long-pectinated, the branches very gradually decreasing in size to the tip.

biloba. **S. biloba** *Oberth.* (45 d). Body greyish brown. Forewing dark brown from the base to the dentate postdiscal band, the hindmarginal area occupied by a long yellowish grey spot which is bordered with light grey and distally divided into 2 lobes; discal spot blackish; outer area of wing whitish grey, beyond the postdiscal line a row of black vein-dots, near the margin a dark band. Hindwing greyish brown, with a slightly paler median band. — Southern Ussuri district.

lichenicolor. **S. lichenicolor** *Oberth.* (48 h). Essentially larger than *S. biloba*; forewing dark grey-brown, the basal area darkest, the distal marginal area lighter, the disc extended whitish grey, particularly at the costal margin, at apex of cell a large spot, the postdiscal band composed of a double, black, lunate line, which does not quite reach to the hind margin and is distally sharply edged with white; the tooth of scales at the hind margin large and broad. Hindwing light greyish brown, margin dark brown, anal angle somewhat blackish. — Ta-tsien-lu.

23. Genus: **Allodonta** *Stgr.*

Antenna of ♂ pectinate to beyond centre (*leucodera*), or bearing fasciculate cilia to the centre and having the apical half setiform (*plebeja*). Palpi upturned to the middle of the frons, with short end-segment. Thorax with a high erect crest of scales. Hind tibia with two pairs of strongly developed spurs.

Only two species are so far known, both from East Asia. The genus is easily distinguished from the closely allied genus *Notodonta* by the conspicuous thoracical crest, from *Semidonta* by the structure of the ♂-antenna.

A. plebeja *Oberth.* (= *tristis Stgr.*) (46 c). Forewing dark brown, with yellowish clouds in places, especially at the apex of cell around the blackish discal spot; in and below the cell as well as in the marginal area between the veins black wedge-shaped longitudinal streaks; the veins likewise blackish towards the margin. — Amurland and Ussuri district. *plebeja.*

A. leucodera *Stgr.* (= elongata *Oberth.*) (46 b). Vertex and collar greyish white, thoracical crest and patagia as well as the abdomen greyish brown; costal area of forewing very dark brown to blackish from the base to beyond centre, the rest of the costal margin occupied to the apex by a light yellowish grey patch which extends to near the cell; the hindmarginal portion of the wing moreover broadly greyish yellow with some blackish markings; the distal margin dark brown, this colour extending to the lower angle of cell; from base of vein 2 to hind margin a curved black double line; in the anterior half the marginal area between the veins long blackish wedge-shaped spots, which are especially prominent in the light costal patch. — Ussuri district; Japan. *leucodera.*

24. Genus: **Spatalia** *Hbn.*

Antenna of ♂ pectinated to the apex, simple in ♀, at the base a rather large brush of hair. Palpi densely hairy, little extending above frons. Proboscis vestigial. Eyes naked; ocelli absent. Thorax with large erect crest of hair in centre, abdomen with lateral brushes of hair and in ♂ with a forked anal tuft. Legs densely woolly; hind tibia with mid- and end-spurs. Forewing proportionately short and broad, triangular, costal margin straight to near apex, the latter rather acute, the distal margin as long as the hind margin and denticulate, hind margin before the centre with a projection, which bears a large tooth of scales, in the distal half more or less deeply incurved and provided with a second tooth of scales at the hind angle; vein 6 together with the stalk of 7, 8, 9 from upper cell-angle or on a short stalk, 10 anastomosing close beyond its origin with 7, 8, 9, thus forming a small areole. Hindwing broad, evenly rounded, veins 6 and 7 on a short stalk. — Larva slender, smooth and naked, with 16 feet, on abdominal segment 1 a strong transverse swelling which bears a transverse row of 4 small tubercles, on abdominal segment 8 likewise 2 obtuse tubercles. Pupa in a slight web, anal end with a few small hooks.

The genus is distributed over the whole Palearctic and Oriental Regions, but is represented in Europe by one species only, whereas six species are known from East Asia and Japan. The species of *Spatalia* are among the prettiest representatives of the family on account of their bright silvery spots on the forewing and the likewise bright tone of the ground-colour.

S. argentina *Schiff.* (46 e). Yellowish grey, frequently with a decided greenish tone, variegated with darker, more olivaceous, patches, particularly in the basal half and at the distal margin; along the costal margin some dark spots; below the cell a triangular silver-spot edged with rust-yellow and accompanied by 2 small spots, a fourth silver-spot on vein 1, tooth of scales at hind margin and patagia bright rusty; vein-ends dotted with black. Hindwing with a similar ground-colour as forewing. — In Central Europe sporadical and rare, absent from the western districts, commoner in the South-East; in northern South Europe from Catalonia over Northern Italy, Dalmatia, Bukovina to Turkey; also in the countries around the Black Sea and in Southern Asia Minor. First brood in Central Europe from April to June; the second brood, which appears in August, is **pallidior** *Hormuz.* (46 e), being smaller and paler, with an ochreous to reddish yellow tone. — Egg lentiform, whitish, with sharp lateral margin. Larva brownish red, slightly glossy, the tubercles blackish, below the stigmata a row of yellow spots. June—August on Oak. It is easily obtained by beating the lower branches of high oak-trees, but is also found on shrubs and suckers. Pupa blackish brown, in a delicate web under moss. *argentina.* *pallidior.*

S. doerriesi *Graes.* (= plusiotis *Stgr.* pt. nec *Oberth.*) (46 e). Similar to *S. argentina*, but larger and darker. Forewing dark greyish brown, olive-brown or paler, yellowish brown, the hindmarginal area around the silver-spots, the tooth of scales and the patagia bright rust-brown; the central costal portion somewhat paler than the ground, yellowish grey, moreover a yellowish grey spot near the distal margin between veins 5 and 6, which spot is the commencement of a diffuse dentate band that reaches to vein 2 and has a dark outer edge; the silver-spots similar to those of *argentina*, but extended over a larger area, the large central spot also broader, moreover 2 small spots on the bases of veins 2 and 3. Hindwing dark greyish brown. — Ussuri district; Japan. Moth early in June. Larva probably on Oak, as the pupa has been found under shrubs of Oak. *doerriesi.*

S. plusiotis *Oberth.* (46 e). Closely allied to *doerriesi*, forewing somewhat more pointed, the hind margin deeply incurved beyond the very prominent tooth of scaling; ground-colour dark brown, the lighter places bright ochreous brown; the silver-spots less extended, separated into smaller spots; at the apex of cell a large dark grey, not silvery, discal spot; in the distal marginal area two transverse rows of blackish spots, the inner spots elongate. Hindwing yellowish brown. — Ussuri district, Corea, Japan. Larva on Oak, very rare. *plusiotis.*

S. dives *Oberth.* (46 f). Thorax dark brown with a slight violet tone, at its hind margin 2 small promi- *dives.*

nent white spot; abdomen greyish brown, apex and anal tuft dark brown. Forewing dark reddish brown with black basal dot, discocellular vein black, beyond the cell a blackish shadow obliquely extending to the costal margin, a narrow black dentate line before the distal margin; the silver-spots with a slight golden gloss and somewhat variable in size and position, the 3 largest spots in an oblique transverse row from the cell to the hind margin beyond the blackish brown tooth of scales. Hindwing light greyish brown to yellowish grey. — Ussuri district: Japan. Larva on Oak.

argentifera. **S. argentifera** *Walk.* (46 f). Forewing pale brown, darkened before the apex, in the centre of the distal margin and especially between cell and hind margin; along the hind edge of cell a long silver-stripe reaching to the lower cell-angle and beyond it between veins 3 and 4 an additional small streak, which is sometimes broken up into several dots. Hindwing dark greyish brown. — The species is South-Asiatic, but occurs northward to Kashmir.

ornata. **S. ornata** *Oberth.* (46 f). Forewing broader than in the other species, dark reddish or violet brown, with narrow but deep excision at hind margin beyond tooth of scales; costal margin light grey to near apex, a white longitudinal smear between discocellular vein and distal margin; on the disc several blackish transverse lines, before the margin a less distinct submarginal line; at lower angle of cell a silver-spot. Hindwing paler or darker greyish brown. — Ussuri district; Japan.

macrodonta. **S. macrodonta** *Butl.* (= Rosama m.). Forewing variegated with grey and reddish brown, costal margin light grey to near apex, interrupted above apex of cell by a dark brown spot and posteriorly edged with dark brown; below apex a yellow longitudinal stripe which reaches to the distal margin; basal and central portions of hind marginal area golden yellow, densely dusted with bright dark red scales and bearing spots of this colour in the middle and distally; a row of dark brown submarginal spots which bear reddish arcs on the proximal side; the large tooth of scales at the hind margin reddish. Hindwing pale greyish brown. — Northern China; Japan.

cinnamomea. **S. cinnamomea** *Leech* (= Rosama c.) (46 d). Forewing dull cinnamon, with a darker shadow extending from the apex to the central, discal spot and pre- and postdiscal and submarginal lines blackish. Hindwing dark greyish brown. A small species, which recalls *ornata Oberth.* by its broad wings, but the hind margin is only shallowly incurved and the tooth of scales is much less prominent. — Japan.

25. Genus: **Leucodonta** *Stgr.*

Antennae in ♂ serrate to the tip, the teeth with long fascicles of cilia, in ♀ simple, setiform, with very short cilia. Palpi short, little extending beyond frons. Proboscis vestigial. Eyes naked; no ocelli. Thorax and legs with loose woolly hair; hair of abdomen shorter. Forewing broad, similar to that of *Spatalia*, but the costal margin slightly and evenly curved, the apex rather more rounded, the distal and hind margins straight, the latter with a broad tooth of scales before the middle; veins 6, 7. 8, 9 stalked from upper cell-angle, 10 from cell, anastomosing with stalk of 7, 8, 9 and forming a long narrow areole. Hindwing broad, evenly rounded, veins 6 and 7 on a very long stalk, the free ends only about half the legth of the stalk or still shorter. Hind tibia with mid- and end-spurs. — Larva smooth, very sparsely and dispersedly hairy, with 16 feet and without tubercles. Pupa slender, cylindrical, with rounded anal end.

The only known species is

bicoloria. **L. bicoloria** *Schiff.* (= bicolora *F.*, tormentoria *Goeze*) (46 f). Pure white, the forewing with a transverse row of bright ochreous, proximally black-edged spots, commencing at the anterior margin of the cell and becoming much wider towards the hind margin; in the distal half a transverse row of blackish spots, of which only the last one is prominent, standing in a broad yellow patch before the hind margin. Collar white or yellow. Central and Eastern Europe in mountainous districts, on the whole sporadic, and rare in many places, northward to the Baltic provinces and Finland, eastward to the Ural and the Carpathians; Amur and Ussuri districts, Japan. — The species occurs in two light forms in Eastern Asia and Russia, *albida.* **albida** *Bdv.*, whose forewing is almost without markings, and *unicolora.* **unicolora** *Mén.*, which is entirely white excepting a few black scales in the forewing. The former occurs in Northern Europe as far as Finland, and the latter is found in the Baltic provinces and is the predominant form in Eastern Asia. — Egg slightly convex, glossy, white, yellowish or greenish. Larva glossy, yellowish green, with some darker yellow dorsal longitudinal lines and a similar stripe below the intensely black stigmata; legs and anal claspers ringed with black. July—August on Birch. Pupa black-brown, in a white cocoon on the ground between fallen-off beaves.

26. Genus: **Ochrostigma** *Hbn.*

Antenna of ♂ pectinate to the tip, of ♀ very feebly serrate and ciliate. Palpi short. Proboscis vestigial. Eyes naked; ocelli small. Thorax with a broad erect tuft of hair between the patagia. Abdomen with short smooth hair, legs with long woolly hair. Hind tibia with mid- and end-spurs. Forewing similar to that of *Leucodonta*, but the costal margin straighter, the apex rather more pointed, the hind margin in the

the hind margin with a small central projection on which is placed a broad tooth of scales, the outer half very feebly incurved; veins 7, 8, 9, 10 stalked from anterior cell-angle, 6 a short distance below it, no areole. Hindwing broad and evenly rounded, veins 6 and 7 on a short stalk. — Larvae slender, smooth, without hairs and tubercles, the body somewhat flattened. Pupa in a thin cocoon, armed with short points at the anal end.

velitaris. **O. velitaris** *Hufn.* (= austera *Schiff.*, bifasciata *Vill.*, bifascia *Walk.*) (45 e). Thorax grey, with black-brown transverse band, patagia edged with black-brown, abdomen pale brown. Forewing light grey-brown, with a slight reddish violet tint, a sharply marked prediscal curved double band, postdiscal double band less sharp, slightly dentate and filled in with white; at the apex a dark-edged light grey spot; discal spot somewhat lighter than the ground of the wing. Hindwing with a feebly marked narrow light median band. — Central Europe (not in England), sporadic and rare, southward to Central Italy, eastward to Galicia and Hungary, Bithynia and Armenia. Egg semiglobular, whitish. Larva glossy yellowish green, with 4 yellow dorsal longitudinal lines composed of spots, and a broad, white, above brightly red-margined lateral stripe on a level with the stigmata, which have blackish borders. July—September. On Oak and Poplar, especially on the lowest leaves of low bushes. Pupa red-brown, in a loose web in the ground.

melagona. **O. melagona** *Borkh.* (?= obliterata *Esp.*, deleta *Brahm*) (45 c). Similar to *O. velitaria*, the forewing whitish grey in the basal and distal marginal areas, the postdiscal band more strongly dentate, the discal spot whitish, before the apex a dark triangular costal spot. — Central Europe; the northern boundary runs from Belgium through Central Germany and Austria to the Bukovina; a sporadic species. Larva similar to that of *velitaris*, glossy green, with 4 yellowish white dorsal lines and a white side-stripe which edged with red above. July—September, on the lower branches of Oak and Beech. Pupa dark brown. Moth in June—July and August—September, but the second brood does not occur regularly.

ussuriensis. **O. ussuriensis** *Püng.* (49 b) is a recently discovered form which is provisionally placed here; the description kindly sent us by Herr Püngeler is printed below *).

japonica. **O. japonica** *Wileman.* Head and collar blackish, thorax grey, with blackish intermixture. Forewing brownish grey, with dark brown suffusion and yellowish brown base, near which are some diffuse blackish subbasal spots; the double prediscal band black, the postdiscal band white edged with black at both sides; before the apex a dark costal spot which encloses 2 smaller black spots; discal spot indistinct. Hindwing dark greyish brown, with diffuse paler median line. — Japan.

27. Genus: **Odontosia** *Hbn.*

Antenna of ♂ with rather long pectinations, or only serrate with long dense cilia, in the ♀ simple, setiform. Palpi very short. Proboscis vestigial. Eyes naked, ocelli absent. Thorax with dense woolly hair and scales. Legs with long wool. Abdomen more short-hairy. Hind tibia with mid- and end-spurs. Forewing thinly scaled, broad, with almost straight costal margin, pointed apex, rather strongly oblique dentate outer margin, which projects a little more at vein 4; hind margin with a strong tooth of scales before the middle; veins 6, 7, 8, 9 stalked together from the upper cell-angle, 10 anastomosing with stalk of 7, 8, 9 in a point and forming a rather large areole. Hindwing broad, the distal margin likewise dentate and forming a distinct angle with the abdominal margin; veins 6 and 7 on a very long stalk. — Larva slender, with sparse dispersed hair, 16 feet, without tubercles, only abdominal segment 8 bearing a very low dome-shaped swelling. Pupa in a loose cocoon in the ground, stout, with obtuse anal end.

carmelita. **O. carmelita** *Esp.* (= capucina *Hbn.*) (46 g). Antenna of ♂ only dentate and ciliate. Thorax dark brown, with the hind margin of the patagia grey. Abdomen light brown. Forewing dark brown with a reddish tone, the anterior half darkest, the posterior and outer areas strongly suffused with whitish grey; tooth of scales at hind margin black-brown; costal margin at one-third and again at two-thirds with a white spot as indication of vestigial transverse bands, the proximal spot small and often diffuse; of the transverse band usually only

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*) **O. ussuriensis** *Püng.* Expanse, ♂ 36 mm, length of forewing 16 mm: ♀ larger. Somewhat smaller than *melagona Borkh.*, similar in build, but without tooth of scales; ground-colour of forewing purer and more glossy grey, basal area much narrower, bounded by a scarcely dentate black line, median area washed with grey-brown, especially in its anterior portion as far as the long, luniform, black cell-streak: outer median line double, very obsolescent, costal subapical spot similar to that of *melagona*, grey-brown with 2 black transverse bars, marginal line composed of flat black halfmoons. Hindwing lighter grey, in the ♀ with the marginal area slightly darkened. Underside of forewing purer grey, that of hindwing much lighter, particularly in the ♂, whitish with the arcuate line more distal. Thorax light grey, with dark posterior border, prothorax and patagia with dark edges. Antenna of ♂ similar to that of *melagona*, but the apical portion naked, ♀-antenna with shorter pectinations, otherwise as in ♂, very different from the shortly serrate antenna of *melagona* ♀. We place the species only provisionally into *Ochrostigma*. — Ussuri district, an apparently bred pair from M. Korb. R. Püngeler.

the outer one indicated, being represented by black vein-spots which bear each a white dot; along the distal margin dark arcs filled in with white. Hindwing somewhat lighter than the forewing, with darkened anal angle and a narrow diffuse whitish median band. Central Europe, sporadic and rare, as for as Southern Scandinavia, southward to North-East Spain and Northern Italy, eastward to Southern Russia and the eastern parts of the Carpathian Mts.; is absent from Lower Austria and South-East Europe. — In Norway the species is represented *nordlandica.* by a somewhat different form, **nordlandica** *Strand* (described from Saltdalen in Nordland); it is smaller, and the ground-colour is more grey, without the reddish rust tone; the transverse bands and the costal spots are very distinct, especially the latter are prominently black and white. — Egg bluish white, minutely dotted with fuscous. Larva yellowish green, on the back with numerous low prominences which are more yellow and arranged on the whole in 4 longitudinal rows, the spiracles intensely black, each bearing a dark vivid red spot; the stigmata of the anterior and posterior segments, moreover, connected by a whitish longitudinal streak, which is absent from the median segments. June—August, on the top-branches of Birches. Pupa black-brown, in a cell in the ground slightly lined with silk. Moth April—May.

sieversi. **O. sieversi** *Mén.* (46 g). Differs from *carmelita*, apart from the long pectinations of the ♂-antenna, in the forewing being lighter and more evenly suffused with white-grey, the median area between the two whitish transverse bands dark brownish grey and strongly narrowed towards hind margin ending at the blackish brown tooth of scales. — Only known from the eastern parts of Central Europe, Silesia, Galicia, Moravia, and distributed over South and Central Russia to Livonia. Also in East Asia (Amur and Ussuri districts). Egg milky white with brown pole. Larva similar to that of *O. carmelita*, yellowish green, instead of the prominences with 4 continuous yellow dorsal longitudinal stripes. The black stigmata connected with one another by a yellowish red stripe. In May on Birch, grows fast and already pupates the end of the same month. Pupa dark brown, in a rather dense cocoon on the ground. The moth appears the next spring. Lately the species has frequently been bred from the egg, and it has thereby been observed that the larva thrives best when fed only with quite freshly developed, young, leaves. But even then rearing from the egg is often unsuccessful.

28. Genus: **Lophontosia** *Stgr.*

Nearest to *Odontosia* and the following genus *Lophopteryx*, differing from both in the more strongly developed palpi, which distinctly reach above the frons, and the very smoothly scaled thorax. The ♂-antenna has rather long pectinations, but these are shorter than in *Odontosia sieversi*. Very characteristic is the anal marking on the hindwing. — The genus comprises only one East-Asiatic species.

cuculus. **L. cuculus** *Stgr.* (46 d, 49 b). Forewing dirty brownish or grey, the pre- and postdiscal bands black, strongly dentate, the area between them dark grey, the tooth of scales black. Hindwing brownish grey, with a black bar before the anal angle interrupted by 2 white spots. — Southern Ussuri district (Sidemi); Japan. The figure 46 d represents on unusually grey specimen; more frequent are brownish grey or brown specimens, like 49 b.

29. Genus: **Lophopteryx** *Steph.*

Allied to *Odontosia*. Antennae serrate in ♂ with long cilia, in ♀ the teeth very faintly indicated. Palpi somewhat projecting beyond the hair of the frons. Proboscis present. Eyes slightly hairy, ocelli absent. Thorax with a broad, high erect crest of scales. Legs with long and dense wool. Abdomen with short hair, in ♂ with some lateral tufts before apex. Hind tibia with mid- and end-spurs. Forewing somewhat broader than in *Odontosia*, with sharper apex and more strongly dentate margin, but the tooth at vein 4 absent; hind margin somewhat surved, with a broad pointed tooth of scales; venation as in *Odontosia*, but the stalk of vein 6 is very short, and stalk of 6 and 7 in the hindwing is also essentially shorter. — Larva cylindrical, with 16 feet, naked, only clothed with single long hairs or sparse tufts, on segment 8 of abdomen a single or double tubercle. When at rest the fore and hind parts are raised. Pupa with or without spines at the anal end.

camelina. **L. camelina** *L.* (? = capucina *L.*) (46 g). Thorax and forewing reddish grey, the ground lighter or darker, the two transverse bands narrow, black and very sharply dentate, strongly approximated at the tooth of scales of the hind margin; beyond the postdiscal band a whitish submarginal band, often but feebly indicated. Hindwing paler, yellowish brown or greyish brown, with black anal spot traversed by a transverse whitish line, and with a slightly indicated pale postdiscal band. Distributed from Northern Spain and Central Italy through- *giraffina.* out Europe, northward to Scotland and Scandinavia, eastward throughout Siberia to Corea and Japan. — **giraffina** *Hbn.* is a dark form with the ground-colour of the forewing red-brown to blackish; it occurs throughout the distribution-area of *camelina*, being rare in the West, but commoner in Japan. — Egg strongly globose, whitish. Larva at first green with glossy black head and numerous deep black dots which bear long hairs. Fullfed greenish to pale brown-red; on abdominal segment 8 two dark red pointed tubercles. Stigmata black, behind each a red spot. May—September on various deciduous trees, particularly Birch and Lime, at first gregarious. At rest the head is raised in Sphinx-shape. Pupa dark red-brown, the pointed anal end with several thin spines;

at the foot of trees in a cell in the ground. Moth in 2 broods in the South, April—May and July—August; from Central Germany northward one brood only, April to June. One of the commonest Prominents.

saturata. **L. saturata** *Walk.* (46 h). A North Indian species closely related to *camelina*, and lately also found in Japan. Forewing dark red brown with a grey tone and sharp black pre- and postdiscal bands. Hindwing greyish brown, the black anal spot bounded by a sharp whitish transverse line. — In the southern Ussuri-district the species is represented by a special form, *hoegei.* **hoegei** *Graes.*, which differs from the closely allied *camelina* and *giraffina* int he colouring being darker, more brown-grey, and in the black markings being more sharply developed; moreover, the outer edge ef the median band is less sharply dentate, more straight, the lobe of scales at the hind margin paler than the ground. Larva (according to Graeser) pale yellow, glossy like lack, with single small hairs and glossy black head; segment 1 swollen and above reddish yellow, 2—11 with sven thick black longitudinal lines, 11 with a prominence which bears two obtuse brick-red tubercles. Laterally a sulphur-yellow longitudinal stripe from head to anus, the body black below this stripe, a yellow longitudinal stripe on the underside. Thoracic legs yellow with black claws, abdominal legs black with narrow yellow rings. In 2 broods, gregarious on Acer.

cucullà. **L. cuculla** *Esp.* (= cucullina *Schiff.*) (46 h). Forewing pale brown, the costal area extended pale yellowish (collar and vertex of the same colour), distal margin white from near the apex to the hind angle; inner transverse band indicated only at the costal and hind margins, the outer one rather more distal in position than in *camelina*, distinctly double and very sharply dentate; veins likewise black in the outer half; lobe of scales at the hind margin blackish grey. Hindwing greyish brown, the black anal spot divided by a pale line. — In Central Europe, widely distributed, but everywhere much rarer than *camelina*. Absent from Holland,extends eastward to Croatia, southward to Central Italy and Sicily. Also in the Ussuri-district. Egg moderately convex, whitish green. Larva light green to yellow or reddish, with a globose prominence on abdominal segments 2—6, the firstone bearingtwo wart-like tubercles, segment 8 with a long conical forked process. Spiracles with black edges. Head with two dark red-brown longitudinal stripes. June—August on Maple, rarely on Hazel. Pupa dark red-brown, with the anal end obtuse, broadly rounded. Moth from May to early August.

ladislai. **L. ladislai** *Oberth.* (46 h). Closelly allied to *cuculla*, but larger, the markings similar but much more prominent. The ground of the forewing somewhat darker, especially on the hindmarginal half, the bands intensely black and more sharply dentate; the white marginal area essentially the same. Head and collar pure white, like a spot at the base of the forewing. — Amurland and Ussuri-district; Japan. The moth is on the wing in June and July in East Asia.

admirabilis. **L. admirabilis** *Stgr.* (46 h). Body and forewing red-brown, the lobe of scales at the hind margin divided. Of the 3 bands of the forewing only the outer one is well-developed, being a black-edged whitish continuous dentate band, the inner and the middle bands consist merely of separate spots; at the apex of cell a large lunate black discal spot; before the margin a whitish submarginal line from which extend black-edged rays on the veins to the margin. Hindwing brownish grey, with a diffuse darker band; at the anal angle only the margin is darkened. There is no crest of scales on the thorax. — Southern Ussuri-district (island of Askold); Japan.

mirabilior. **L. mirabilior** *Oberth.* Very similar to the preceding, but distinguished by strongly undulate distal margin of the forewing and the more prominent markings. The white pre- and postdiscal bands are strongly developed and sharply dentate, in front of the whitish-bordered yellowish brown discal spot there is in the cell another similar spot also with white border. Hindwing yellowish brown with blackish median band. — Ta-tsien-lu, Sze-chuan, West China.

velutina. **L. velutina** *Oberth.* (46 h). Likewise restricted to East Asia, with the markings quite different. Head, thorax and forewing reddish grey, the forewing with a dark brown longitudinal stripe extending from the base of the costal margin to distal margin and bearing in its centre an intensely black longitudinal line; the pre- and postdiscal black dentate bands only distinct in the hinder half. Hindwing and abdomen dark grey-brown, the anal angle only very restrictedly and very feebly darkened. — Amurland and Ussuri-district; Japan.

sinensis. **L. sinensis** *Moore.* Forewing dark brown with slight black spots and pre- and postdiscal dentate bands; from the lobe of scales at the hind margin proceeds a pale grey oblique stripe, and the veins bear light spots in their outer halves. Hindwing with blackish anal patch interrupted by grey colouring. — Shanghai.

pryeri. **L. pryeri** *Butl.* Only known from Japan, where it does not appear to be rare. Similar to *Odon. sieversi*, but the forewing shorter and sometimes of a dark brown ground-colour; lobe of scales at hind margin larger; the black markings and the discal spot more prominent. — At Yokohama the commonest Notodont.

umbrosa. **L. umbrosa** *Leech.* Forewing reddish brown, shaded with dark brown and blackish, with postdiscal dentate band; at the apex of cell a pale spot. Hindwing dark brown. — West China, in July.

30. Genus: **Rhegmatophila** *Standfs.*

Nearest to *Lophopteryx*, with which it agrees in the contour of the wings and their rest-position. Eyes strongly hairy, ocelli absent. Antennae of both sexes pectinate to the apex, the branches much shorter in the ♀ than in the ♂. The crest of scales on the thorax is less sharply cariniform than in *Lophopteryx*, more woolly and hairy than scaled. The lobe of scales at the hind margin of the forewing absent. Forewing without areole, veins 6 and 7 separate, from the cell. Hind tibia with four spurs.

alpina. **R. alpina** *Bell.* (47 g). Forewing bluish grey, with dark basal spots from hind margin forming a kind of transverse band; pre- and postdiscal dentate bands whitish with black borders, the postdiscal one rather far distal and parallel with the margin. Hindwing light brownish grey, with white postdiscal dentate band, the outer area between it and the margin darkened. — In eastern South France (Digne), in 2 broods, May and August—September. Egg semiglobular, at first uniformly dark green, later on violet with white polar spot and white ring. Larva flattened and blue-green on underside, broadest in centre, somewhat tapering in front and behind, the dorsum grey, underside coloured, with a more or less prominent reddish tone and irregular longitudinal rows of whitish dots and streaks; segments 3—12 with 2 longitudinal rows of dark brown spots, which are largest on 5 and 12. Spiracles white with black edges, placed in a dark stripe running from the head to the anus. The tubercles are arranged in 3 longitudinal rows, but on segments 2—5 in 4 rows, and bear light brown tufts of hair. On Poplar and some large-leaved species of Salix; they feed at night and are concealed in daytime in narrow fissures in the bark. Pupation in a weak cell some fingers' width beneath the surface. Pupa very hard, glossy dark brown, as in *Lophopteryx*, slightly conical with obtuse anal end.

31. Genus: **Pteroma** *Stgr.*

Antenna of ♂ with long pectinations. Palpi short and thin. Thorax without distinct crest (perhaps worn off in the only known specimen ?), on the metathorax a short tuft of woolly hair. Abdomen smooth-hairy, with very short tuft of hair. Forewing similar to that of *Lophopteryx* in contour, with undulate distal margin and at hind margin two widely separated lobes of scales. — The markings of the only known species, from Central Asia, completely deviates from the type found in the allied genera *Spatalia* and *Lophopteryx*.

eugenia. **P. eugenia** *Stgr.* (46 f — copied from Staudinger's figure in the Iris; as this figure is hardly recognisable, we bring another, from nature, on pl. 49 b). Forewing grey reddish brown, with a fawn brown longitudinal stripe in the basal half along the costal margin and another in front of the hind margin; the area between these stripes occupied by a broad whitish streak from the base to beyond the cell; in the distal-marginal area 2 further large whitish spots edged with fawn-brown; pre- and postdiscal bands only represented by an interrupted, feebly dentate double line with a white line in between; the two lobes of scales black-brown. Hindwing blackish grey, with whitish fringes and a strongly obsolescent pale median stripe. — Chinese Mongolia (Uliassutai).

32. Genus: **Pterostoma** *Germ.*

Antennae pectinate to the tip, the branches long in ♂, short in ♀. Palpi strongly prolonged, far projecting, as long as the thorax, and clothed with long hairs and scales in dorso-ventral direction, therefore appearing strongly compressed, with lanceolate end-segment. Eyes naked, ocelli absent. Proboscis feebly developed. Thorax with long hair and scaling, and with a pointed erect crest of scales in the centre. Legs with long woolly hair; hind tibia with mid- and end-spurs. Abdomen with longer hair only on the back, otherwise smooth-hairy, in ♂ with long anal hair. Forewing very elongate, costal margin almost straight, apex very sharp, distal margin strongly oblique, evenly convex, and dentate, hind margin with a strong lobe of scales in the centre, beyond it a shallow rounded sinus, and near the outer angle a second, smaller, lobe of scales; veins 6 and 7 separately from upper cell-angle, 8, 9, 10 on a long stalk, the stalk anastomosing more or less distinctly with 7 in a point, a long and narrow areole being formed. Hindwing semicircular, the apex rather pointed and the distal margin slightly undulate; veins 6 and 7 stalked. — Larva naked, Noctuid-like, moderately flat and relatively broad, with 16 feet, and 4 rows of granules commencing on the second thoracical segment, the tubercles of the two lateral rows smaller than those of the middle rows, there being an additional similar row on each side on a level with the spiracles. At rest the head is held horizontally forward, the frons being directed upwards. Pupa cylindrical, with spinose anal end; in a cell in the ground lined with silk.

palpina. **P. palpina** *L.* (47 a). The specimens of the first brood larger, predominantly grey-brown, those of the second brood smaller, light straw-colour. The transverse bands of the forewing only indicated by black vein-dots, the postdiscal band more complete than the other, being marked by double dots separated by white and placed in a slightly darkened shadowy band; all the veins more or less extended black; the proximal lobe of scales of the hind margin for the greater part black. Hindwing of the same ground-colour as the forewing, with lighter median band. — Distributed throughout Europe with the exception of Greece; in North-West Africa, northern Asia Minor, and also in Amurland. Two broods in Central Europe, April—May and July—

August, from the Baltic provinces of Russia northward only one brood, May—June. — The form from Lapland, **lapponica** *Teich.* is uniformly dark grey-brown, the light median band of the hindwing absent. *lapponica.* — A likewise dark form is known from the Black Sea and Southern Siberia (Ili), being presumably more widely distributed in Central Asia; this is **pontica** *Stgr.*, in which the light band of the hindwing is scarcely indicated. *pontica.* — Egg strongly globose, whitish green with darker spot at the pole. Larva light bluish green, with 6 rows of raised white dots, 4 being dorsal and 2 lateral. Above the spiracles a white longitudinal stripe which is anteriorly thinly edged with fuscous, at the prothoracical stigma a red streak. May to October on Poplar, Oak, Lime and Salix. Pupa dark red-brown. The moth is very common and usually settles on the bark of Poplars or Willows on such spots where the light wood appears through the damaged bark, the moth having the same colour as such light spots. The pencilling of the wings, which are held in steep roof-shape, render the specimen exactly similar to a splinter of wood, of which the palpi represent the split end, the resemblance being especially striking in a pair in copula.

grisea. **P. grisea** *Brem.* (= ab. brunnea *Graes.*) (47 a; doubtful, if belonging to *grisea*?). This species described from the Ussuri is not yet sufficiently known. Graeser evidently confounded it with *sinica*, *Moore* while Leech placed it as a synonym to *palpina L.* According to the description the insect differs from *palpina* as well as from the certainly closely allied *sinica* in the light rust-brown hind margin and the light ochreous lobe of scales of the forewing, from *palpina*, moreover, in being much larger, agreeing with *sinica* in size and according to the figure also in the great width of the tooth of scales. The ground-colour is grey-brown; the hindwing bears a light transverse band. — Whether the larva described by Graeser as that of *grisea* belongs to this species or to *sinica* remains also doubtful.

sinica. **P. sinica** *Moore* (= gigantina *Stgr.*) (47 a, b). Larger than *palpina*, varying like this in the ground-colour from light straw-colour to dark grey-brown; mostly easily recognized by the large tooth of scales at the hind margin of the forewing. A less reliable difference is the presence of a third (subbasal) transverse band, as this band is by no means always developed and, moreover, occasionally also occurs in *palpina*; unreliable is further the light colouring of the lobe of scales, for this tooth is sometimes as dark as in *palpina*. The above-mentioned red-brown colouring of the hind margin of the forewing in *grisea* is for the present the only difference known between that species and *sinica*. — At the same localities a light form and a dark one occur, which differ in the ♂♂ particularly in the hindwing of the dark form being deep black-brown. It is not improbable that these forms are seasonal. As the name *sinica Moore* refers to the light form, *gigantina Stgr.* might be saved for the dark brood, as the author describes the hindwing as being usually dark blackish grey. — The larva is very different from that of *palpina*, yellowish green, with a broad light yellow lateral stripe. It feeds according to Graeser on Maackia amurensis, not on Poplar, and L. Klapheck, who bred the species several times, confirms this remarkable occurrence on a kind of tree widely different from the Saliceae. — Distributed and not rare in Amurland, Northern China, southward to Shanghai, especially near Tsingtau, Pekin and in Jen-chou-fu; said to occur also in Japan.

33. Genus: **Ptilophora** *Steph.*

Antennae in ♂ with remarkably long branches, in ♀ thin, setiform, with short teeth and bundles of short cilia. Palpi short, completely concealed in the hair. Proboscis vestigial. Eyes naked; no ocelli. Head, thorax and legs with very long wool, hair of abdomen shorter. Legs rather weak; hind tibia with short end-spurs. Wings thinly scaled, transparent; forewing elongate, costal margin quite straight in ♂, slight convex in ♀, distal margin strongly oblique, evenly rounded, hind margin shallowly incurved in ♂, with smooth edge in ♀, the wing therefore appearing somewhat broader in ♀, before the middle with a broad tooth formed by the marginal hairs, which are especially long in the ♂; vein 6 from upper cell-angle, 7, 8, 9, 10 stalked together, 10 immediately beyond cell. Hindwing rounded-triangular, veins 6 and 7 on a very long stalk. — Larva slender, naked, Noctuid-like, without any tubercles; 16 feet.

plumigera. **P. plumigera** *Esp.* (47 g). Body and forewing light brownish red, the latter with a postdiscal whitish dentate band, variegated with grey in the ♂. Hindwing paler grey, with a slight reddish suffusion. Central Europe, common in some places, northward to Southern Scandinavia, southward to Northern Italy, throughout Northern Asia, and in Japan on the main island as well as in the Hokaido. On the wing only in the autumn, October—December, in exceptional cases, when a strong frost set in very early, not found before February. — Egg strongly globose, the pole flattened, dark brown with light rings; deposited on buds, and hibernates. Larva light yellowish green or pale yellowish, with darker dorsal line edged with white; at the sides two white lines, of which the lower one is placed on a level with the stigmata. Until July on Acer campestris, much more rarely an other deciduous trees (Fagus silvatica, Prunus); usually common where the food-plant is abundant, so that young trees are often badly decimated. Pupa dark brown, with black spots, the anal end pointed; in a silk-lined cell in the ground.

kashgara. **P. kashgara** *Moore.* Body greyish brown, abdomen brown with black apex, segments 1—3 with blackish tuft of hair. Forewing dark greyish brown, with subbasal, pre- and postdiscal dentate black-brown bands; fringes black-brown, spotted with grey. Hindwing greyish brown. — East Turkestan (Yangihissar).

34. Genus: **Himeropteryx** *Stgr.*

♂-antenna with long pectinations, which are shorter towards the apex; ♀ not known. Palpi obliquely upturned, long-hairy, extending beyond the hair of the frons only with the short end-segment. Proboscis vestigial. Eyes naked; ocelli absent. Thorax and legs with very long dense woolly hair, abdomen with shorter smooth hair. Hind tibia with long mid- and end-spurs. Forewing relatively very broad, triangular, apex rather sharp, distal margin steep, slightly undulate, hind margin with a broad pointed tooth of scales in centre; veins 6, 7, 8, 9 stalked, 6 close beyond cell, 10 from the cell, anastomosing with the stalk of 7, 8, 9 and thus forming a narrow triangular areole. Hindwing broad, rounded, veins 6 and 7 stalked.

The remarkably broad forewing with their steep distal margin at once recall Geometridae, especially *Himera* and *Crocallis*. Staudinger, who considered the genus a connecting link between the Notodontids and Geometrids, has already drawn attention to this similarity and expressed this view in the name chosen for the genus. So far a single species has been found in East Siberia and only a few specimens obtained, the species having hitherto remained one of the greatest rarities.

miraculosa. **H. miraculosa** *Stgr.* (47 c). Thorax dark brown, abdomen yellow-brown. Forewing yellowish grey or yellowish brown, with a broad dark red-brown median band not correctly represented in the figure which commences at the lobes of scales in the centre of the hind margin, is anteriorly devided by a large rectangular pale discal spot and does not reach the costal margin; basally to this band a subbasal similarly coloured band which is only distinct at the hind margin; distally 2 transverse rows of similarly coloured spots, of which the outer row placed close to the distal margin is strongly obsolescent. Hindwing agreeing with the forewing in the ground-colour, without markings. — Amurland (Raddefka); lately also sent from the Su-chan, east of Vladivostok. Also found in Japan.

35. Genus: **Phalerodonta** *Stgr.*

Antennae slightly dentate and ciliate in ♂, setiform in ♀. Palpi of ♂ distinctly projecting beyond frons, segment 2 long-hairy, 3 porrect and smoothly scaled; shorter in ♀. Proboscis feebly developed. Thorax with long and dense woolly hair, abdomen of ♀ with a long and very densely woolly anal tuft, which is less dense in ♂. Forewing rather broad, costal margin straight to near apex, the latter rounded, distal margin moderately strongly oblique and very slightly undulate, hind margin somewhat excised at the base, with a broad but very short lobe of scales.

bombycina. **P. bombycina** *Oberth.* (47 c). Body light greyish yellow. Forewing with slight brownish tint, quite straight prediscal transverse line and strongly curved postdiscal one, both dark brown, the latter continued over the light grey-yellow hindwing as dark arcuate line. Ussuri-district. — Graeser has described the early stages. The egg hibernates. The larvae feed exclusively on Oak, being gregarious until pupation, but without a common web. They also resemble *Phalera bucephala* in facies. They are black, with rather large glossy black head bear single stiff hairs and on each segment some cherry-red spots. They rest with raised fore and hind parts, also as the larvae of *Ph. bucephala*. Pupation at the foot of the trees in a hard, leathery cocoon loose silk-threads intermixed with lumps of soil forming together with the cocoon a large clod. The cocoon itself, however, is disproportionately small as compared with the larva. Pupae June—July, the moths in the same antumn, early in October.

36. Genus: **Nadata** *Walk.*

Antennae in ♂ pectinate to two-thirds, the rest dentate, in ♀ simple, setiform. Palpi obliquely upturned to half the frons, densely and smoothly scaled, the short stump-like end-segment distinctly marked. Eyes naked. Thorax with long and dense, but smooth hair, and with a high, erect, laterally compressed crest of scales. Legs with long dense hair, abdomen also rather long-hairy. Hind tibiae with rather short but strong mid- and end-spurs. Forewing elongate, but relatively broad, costal margin rather strongly convex in distal half, distal margin moderately oblique and undulate, more strongly angulate at veins 6 and 4, but less projecting at vein 5, so that there is a broad sinus between veins 6 and 4; hind margin usually with a moderately large lobe of scales in the centre; vein 6 together with the stalk of 7, 8, 9 from upper cell-angle. 10 from cell, anastomosing with 8, 9 beyond 7 and forming a large areole. Hindwing broad, rounded, veins 6 and 7 stalked. — The genus occurs also in North America besides Japan, East Asia and the Himalayas.

cristata. **N. cristata** *Butl.* (47 b). Head, collar and hairs of legs whitish grey. Thorax light greyish brown with a slight reddish tone and also strongly intermixed with white. Abdomen and hindwing light ochreous brown. Forewing ochreous to grey-brown, the central area between the bands always more or less distinctly shaded with grey; 3 diffuse narrow dark brown transverse bands, prediscal, discal and postdiscal, the two first converging behind and meeting each other at the hindmarginal tooth, the third parallel with the central one; close before the apex of cell two rounded yellow spots; fringes white between the veins. — East Asia, Southern Amurland, North China, Japan. The larva smooth and glossy, whitish green, with large globular head and yellow lateral oblique stripes. In the antumn on Oak. The moth in June and July, rare in most places.

N. splendida *Oberth.* (47 c). Smaller than *cristata*, forewing with the margin more evenly undulate, *splendida.* and without lobe of scales at the hind margin; only 2 transverse lines, which meet in the centre of the hind margin. Head, collar and costal edge of forewing whitish. The ground-colour of the forewing grey-brown, the hind margin broadly ochreous yellow; at the proximal side of the large yellow discal spot 2 small dark brown ones. Hindwing dark brown, with the fringes ochreous yellow. — Ussuri district; China.

N. niveiceps *Walk.* A form from the boundary between the Palearctic and Oriental Regions. Head *niveiceps* and thorax light brown, very strongly mixed with white, especially vertex and collar. Abdomen bright ochreous brown. Forewing light grey-brown, with a brown diffuse discal spot and likewise indistinct dark postdiscal band. Easily distinguished from the closely allied East-Asiatic *cristata* by the essentially deeper marginal sinus between veins 6 and 4 in the forewing. — North-Western Himalayas (North Hindostan).

37. Genus: **Gangarides** *Moore.*

This genus has until lately been united with the *Eupterotidae*, but undoubtedly belongs to the *Notodontidae*. Like the preceding genera it is essentially Oriental and reaches only the boundary of the Palearctic Region. Only one species is known.

Antennae of ♂ and ♀ with very long pectinations, the branches however becoming suddenly small shortly before the apex. Palpi obliquely upturned almost to the height of the vertex, broad with scaling, end-segment small. Proboscis small. Eyes naked. Tibiae with long and very dense crests of hair. Forewing broad, apex produced and sharp, distal margin rather straight, distinctly undulate, hind margin almost straight. In the forewing vein 5 from the centre of the discocellulars, 6 and 7 from the upper angle of cell, 8, 9 and 10 on a long stalk which anastomoses with 7 in a point, a long areole being formed. In the hindwing vein 5 as in forewing, 6 and 7 stalked, 8 connected with middle of cell by a very short and indistinct transverse vein.

P. roseus *Walk.* (= dharma *Moore*, vittipalpis *Walk.*) (29 c). Antennae light brown. Palpi grey, with *roseus.* dark brown upperside. The ground-colour of the body and wings a rather bright cinnabar red which is quite pure in tint in the centre of the thorax, on the abdomen and hindwing, while the patagia and forewing have a golden brown to light greyish brown colouring. Forewing with white-edged black discal dot and 4 blackish transverse lines, the first subbasal angulate, second before and third beyond apex of cell, and the fourth from the apex obliquely to the hind margin; this last line accompanied on its proximal side by a narrow white border, which is widened to a small but prominent spot close to the hind margin. Underside pale yellowish grey-brown, reddish only in the centre of the forewing and at the abdominal margin of the hindwing, both wings with black discal dot, which is bordered with white in the hindwing. — Anterior India and Sunda Islands, occurs in Kashmir on Palearctic territory and extends in the eastern Himalayas to the frontier of Tibet.

38. Genus: **Phalera** *Hbn.*

Antennae shortly serrate in ♂ with long fascicles of cilia, in ♀ simply setiform. Palpi hardly reaching beyond the hair of the frons. Proboscis feebly developed. Eyes naked. Thorax with dense hair and scaling, with a broad crest-like transverse elevate scaling in front of the hind margin. Abdomen, which is clothed with dense smooth hair, very long in proportion to the exceptionally short and broad thorax, which appears especially clumsy because the head is retracted into the thorax. Legs with long dense hair; hind tibia with mid- and end-spurs. Forewing rather broad, triangular, broader in ♀ than in ♂, apex and hind angle rounded, hind margin smooth. Veins 6, 7, 8, 9 stalked, 10 from cell, anastomosing for a short distance with the stalk of 7, 8, 9 or beyond 7 with 8, 9, a long areole being formed. Hindwing broad and evenly rounded, veins 3 and 4 together from lower angle of cell or on a short stalk, 6 and 7 on a somewhat longer stalk. — Larva elongate-cylindrical, with 16 feet and without tubercles; hair rather dense, soft and long. Gregarious but without web on various deciduous trees; the young larvae eat holes into the leaves. They disperse before pupation. Pupa without cocoon in the ground, glossy, coarsely punctuated and grooved, with 2 strong points at the anal end.

The typical representative of the genus in the Palearctic Region is *Ph. bucephala*, the well-known Buff-tip, which is common everywhere. The very characteristic style of marking of this moth is repeated in its essentials in the other three Palearctic species and also represented at least by the more or less distinct apical patch of the forewing in the exceptionnally large species which occur in India. When at rest the wings are so closely wrapped round the cylindrical body that the thorax and the buff patch simulate the ends of a broken off piece of a twig and the silvery grey forewing its bark. Freshly emerged specimens have a slight musk scent.

bucephala. **P. bucephala** *L.* (47 d). Buff-tip. Head, collar and centre of thorax brownish yellow, patagia greyish white with a black-brown double basal edge, on the transverse crest 2 black-brown transverse lines, hind margin greyish white. Abdomen yellowish grey to yellowish brown. Forewing greyish brown, broadly white at the base and along the hind margin, with prediscal dark brown and black double band; at the apex a large oval yellow patch reaching down to vein 4, proximally bordered by a dark red-brown semicircle, and traversed below the apex by a broad dentate dull ochreous submarginal spot; the black postdiscal band semicircular in the costal half, parallel with the dark border of the apical patch, and then dentate, accompanied on the outer side by a dark brown line; discal spot whitish; the scaling with a strong silky gloss, excepting the apical patch. Hindwing whitish grey, with a very slight indication of a dark median band. On the underside both wings have a prominent black-brown discal band, forewing moreover with a black-brown marginal line. Throughout Europe with the exception of the Arctic Region and Greece; also in North-East Africa, Asia Minor, Siberia to East Asia. In Central Europe abundant everywhere in May and June, a second brood in July and August appears regularly only in the South. — In Norway and Southern Sweden, also in England occurs a *tenebrata.* dark form, **tenebrata** *Strand*, in which the white colouring of the forewing is more or less strongly reduced, par- *demaculata.* ticularly in the median area, while the hindwing is paler or darker grey. In ab. **demaculata** *Strand* (47 d) the *bucephalina.* pale discal spot of the forewing moreover is absent. — **bucephalina** *Stgr.*, which represents the species in Western Morocco, is also characterised by a darker colouring of the ground. In addition, the discal spot is more prominent and the apical patch larger, in which characters this form approaches the next species, *bucephaloides.* — *infulgens.* In the East-Asiatic **infulgens** *Graes.* (47 d), which is common in the Amur and Ussuri districts, the whole forewing is uniformly whitish grey without gloss, the anterior half being hardly darker than the hind margin; the hindwing is somewhat narrower. — Egg strongly, convex green with darker top and paler base. Larva orange-yellow, with glossy black head and yellowish grey hair, as well as black longitudinal stripes interrupted between the segments, 5 stripes dorsally and 2 laterally, between the latter pair the black spiracles are placed. Underside black with broad yellow median stripe, abdominal legs black outside and yellow inside. June to October, on Salix, Poplar, Birch, Lime and Oak. Pupa glossy black-brown, sometimes hibernating twice.

bucephaloides. **P. bucephaloides** *O.* (47 d). Differs from the very similar *bucephala* in the more uniform distribution of the silvery scaling on the forewing, the large yellow prominent discal spot and the larger and somewhat lighter apical patch. Moreover, the dark discal band is absent on the underside. Southern France, Lower Austria, Galicia, Hungary to Dalmatia, Balkan countries, Southern Russia and Syria. — Egg milky white with grey base and grey pole. Larva reddish yellow, the intersegmental incisions conspicuously reddish, the whole body densely covered with white dots which are very prominent, especially on the black longitudinal stripes, which are thereby rendered rather indistinct. Stigmata black, bordered with white, from each stigma a short white stripe extends forward. Underside pale; abdominal legs black on outside. On abdominal segment 8 a dome-shaped protuberance, on the anal segment a glossy black spot which encloses 2 small pale tubercles. August and September, on Oak. Pupa dull black-brown with rough surface. Moth in June and July.

assimilis. **P. assimilis** *Brem. & Grey* (= ningpoana *Feld.*, staudingeri *Alph.*, fuscescens *Butl.*) (47 e). The third of species resembling *bucephala*, inhabits East Asia. Forewing rather evenly silver-grey, only slightly darkened at the costal margin, near the base with a black band which is absent from the two allied species; the yellow apical patch not extending along the distal margin, but distally reduced from close below apex, therefore not oval but luniform; discal spot only slightly indicated. Hindwing dark grey-brown. — Amurland, China (Tsingtau), Corea and Japan, in many localities rare.

alpherakyi. **P. alpherakyi** *Leech.* Allied to *P. assimilis.* Forewing brownish grey, with several dark dentate bands, of which the subbasal one is distinctest; apical patch yellow, proximally with white border and encircled by the postdiscal double band; discal spot white with black centre. Hindwing dark brown, with diffuse pale transverse band. — Pu-tsu-fong.

flavescens. **P. flavescens** *Brem. & Grey* (= andreas *Oberth.*) (47 e). Head and thorax pale greyish yellow, abdomen yellowish brown, in ♂ with a grey spot on the last segment. Forewing pale greyish yellow, with several indistinct brownish transverse dentate bands, near base below cell a circular grey spot distally bordered by a black halfmoon; below the somewhat lighter apex commences a broad grey marginal band extending to the hind margin and bordered on the proximal side with black lunules bearing a dark red proximal line. Hindwing with a broad dark brown submarginal band. Ussuri district, Corea, Japan, China. — Larva (according to GRAESER) in the Ussuri district in August—September on various deciduous trees, especially Birch; similar in shape to the larva of *bucephala*, gregarious like this until dispersing for pupation, and with the some characteristic rest-attitude. Uniformly dull black, with the incisions somewhat reddish, clothed with rather dense and soft yellow hair; on each side two very thin yellowish longitudinal lines, between which the velvety black spiracles are placed. Underside black, with thin yellow median line, a slight reddish tint between each pair of legs. The pupa hibernates.

sangana. **P. sangana** *Moore* (47 c). Vertex greyish white, body dark brown, patagia and intersegmental incisions of abdomen grey. Forewing dark grey-brown, more or less suffused with yellowish grey, the black pre- and postdiscal bands rather sharp, marginal band nearly as in *flavescens*, but much less prominent on the dark ground; discal spot and a round light spot before apex of cell indistinct; the apical patch also often indistinct and hardly contrasting with the ground-colour. Hindwing dark brown. — It is one of the large species characteristic of the Indian fauna. Its true home is India, the species being found only in the boundary districts of the Palearctic Region and extending northward to Shantung; it is not abundant.

sigmata. **P. sigmata** *Butl.* (47e, as *signata*). Forewing greyish white, dusted with numerous black-brown scales; prediscal band indistinct; discal spot composed of erect black scales; close beyond cell 3 irregular dentate black-brown transverse lines, and along the distal margin a row of black Σ-shaped markings. Hindwing dark brown. — Japan, West China; common.

39. Genus: **Pygaera** *O.* (Ichthyura *Hbn*).

Head small, strongly retracted. Antennae pectinate to the apex, the branches long in ♂, short in ♀. Palpi rather large, porrect, extending above frons, densely hairy. Proboscis vestigial. Eyes hairy, ocelli absent. Thorax densely hairy, with raised median crest; abdomen slender, pointed in ♂ with forked anal tuft. Legs densely hairy, especially the forelegs, which bear in most species very dense woolly hair down to the tarsi. Hind tibia with mid- and end-spurs. Forewing broad, the apex slightly anguliform or rounded, distal margin more or less strongly convex, sometimes excised below apex, hind angle rounded; vein 6 from upper angle of cell or shortly stalked with 7, 8, 9, 10; no areole. Hindwing broadly rounded, veins 6 and 7 on a short stalk, 5 but slightly developed. — The eggs are semiglobular, moderately convex or lentil-shaped, irregularly ribbed and reticulated. Larvae cylindrical, with rather dense and moderately long hair, on abdominal segments 1 and 8 with diversely developed, sometimes transverse tubercle or protuberance, in addition small warts and tubercles which may be present from thoracical segment 2 backwards on the dorsum as well as sides, and sometimes are enlarged to processes on the thorax. The larvae feed on Salix and Poplar, and there are usually 2 broods in the temperate districts. Pupation in a loose cocoon between the leaves of the food-plant, more rarely on the ground. The pupae have a strong gloss; the anal end of the larger number of species is produced into a long thin process which bears several small hooks.

The species of *Pygaera* incline to hybridisation. The closely allied and easily procurable species, such as *curtula*, *pigra* and *anachoreta* are therefore favourite objects, like the species of *Celerio* among the *Sphingidae*, for experiments in cross-breeding. The best-known hybrids obtained are the following: *Pyg.* hybr. *prima Tutt* (*curtula* ♂ × *pigra* ♀), hybr. *inversa Tutt* (*pigra* ♂ × *curtula* ♀), hybr. *difficilis Tutt* (*anachoreta* ♂ × *curtula* ♀), hybr. *raeschkei Standfs.* (*curtula* ♂ × *anachoreta* ♀). Moreover, the resulting product of a recrossing of these hybrids with the parent species have also been described. Lately the *Pygaera*-hybrids have been used for investigating the Mendelian law of heredity.

timon. **P. timon** *Hbn.* (47 f). Greyish brown, with whitish or reddish tinted pre- and postdiscal and submarginal bands, the two outer ones commencing with a prominent white costal spot; before the first band a red-brown or black-brown transverse band which is centrally enlarged to a triangular spot proximally narrowly edged with white. Hindwing greyish brown, with feebly marked light median band. — Occurs especially in Russia but is very rare even there, single specimens occasionally obtained in Finland, East Prussia, Moravia and Upper Hungary. Also in East Asia, Amur and Ussuri districts and Japan. Egg glossy light green. Larva from June to August on Aspen, always singly, dark ashy grey, with short ashy grey hair, on the raised abdominal segment 1 four and on the following segments two small red wart-like tubercles. Abdominal legs dark greyish green. Pupa dark brown, with obtuse anal end, on the ground or between leaves in a loose whitish web. The larvae are easy to rear, accepting also Black Poplar as food.

timonides. **P. timonides** *Brem.* (= timoniorum *Brem.*, latipennis *Butl.*) (47 f). Easily recognised by the distal margin of the forewing being excised below apex and projecting between veins 5 and 4. Dark brownish grey; forewing with a rather large triangular blackish spot whose base rests on the costa, while the tip extends to near the hind margin; pre- and postdiscal and submarginal lines blackish, diffuse. — East Asia: Amur and Ussuri districts, North China, Japan.

denticulata. **P. denticulata** *Oberth.* (56 d). Larger than the previous, forewing longer, its outer margin more strongly dentate, with an especially large tooth in the centre; ground-colour grey, forewing with similar markings as in *timonides*, but the darker costal triangle only reaches to the centre of the wing instead of to the hind margin. Hindwing with darker anal area, otherwise without markings. — Sze-chuen.

sieversi. **P. sieversi** *Stgr.* (47 f ♀). An exceptionally small species. Forewing of ♀ yellowish brown, somewhat darker at apex and hind margin, narrower and longer in the ♂, reddish brown or light chestnut; 3 light transverse bands bordered by a dark double line, subbasal, pre- and postdiscal, the middle band being divided in its hinder half; postdiscal band in ♂ only a simple narrow blackish dentate line; a row of dark submarginal dots, in ♂ distinct only at the apex; discal spot small, dark. Hindwing blackish grey-brown, with yellowish brown anal angle. — Ussuri district.

troglodyta. **P. troglodyta** *Graes.* (47 f). Nearly related to *P. sieversi.* Forewing light reddish brown, in places darker with greyish brown violet tone; transverse bands as in *sieversi*, especially the central one, but the subbasal band absent. Hindwing blackish grey with light reddish brown anal angle. — Ussuri district, Corea, Japan.

anastomosis. **P. anastomosis** *L.* (47 f). Body and wings of a grey-brown ground-colour, vertex and centre of thorax deep black-brown, velvety. Forewing extended rust-brown below the apex, with 3 narrow dark-edged transverse bands, the subbasal one interrupted at the hind edge of the cell and its posterior portion somewhat shifted distad, the pre- and postdiscal bands approximated at hind margin and connected below cell by means of a dark, oblique, posteriorly sharply defined spot; discal spot circular, crossed by the light-coloured discocellular vein. Europe, from Scandinavia to Southern France and Northern Italy, eastward over Central Asia to East Siberia, Corea, China and Japan. Absent from England and northern Scandinavia. Widely distributed in Central Europe, in 2 broods, April—June and July—August, in the North only 1 brood, May—June, in the South possibly 3. Along with the ordinary form throughout the whole area occur singly dark brown or blackish *tristis.* specimens, **tristis** *Stgr.*, in which particularly the hindwing is deep black-grey. — On the other hand, **orientalis** *orientalis.* *Fixs.*, described from Corea, but also distributed over Eastern Siberia, is lighter than true *anastomosis*, the forewing especially being greyer; the oblique spot connecting the two outer bands is a mere shadow, and the dark median spot of the thorax is edged with a thin white line. — Larva red-brown, with black dorsal spots accompanied on each side by a yellow longitudinal line, with brownish hair. The hump on abdominal segment 1 is black, bears black hair and 4 round dome-shaped tubercles, 2 in front larger, and 2 behind smaller; the hump on segment 8 is similar but somewhat smaller. On thoracical segments 2 and 3 and on the abdomen from segment 2 there are 2 small yellow warts in the black dorsal spots and a small red tubercle on each side in the yellow stripe, the tubercles on the thorax enlarged to small processes. Stigmata black, on abdominal segment 1 a small black tubercle below the spiracle. Head black, with brownish hair. May—June and July—September, on species of Salix and Populus, when young between leaves fastened together, later stages free. Pupa strongly glossy, head and thorax black, wing-cases and abdomen red-brown, the latter produced into a long point bearing several small hooks at the tip, with which the pupa is fastened in the loose grey web.

curtula. **P. curtula** *L.* (= anachoreta *Esp.*) (47 f). Light brownish grey, vertex and centre of thorax very dark brown. Forewing with a large red-brown apical patch, which is proximally bounded by the sharply developed white postdiscal line and posteriorly by vein 3; subbasal and prediscal bands as well as the posterior half of the postdiscal band likewise white, but less sharp; in the brown apical patch a blackish submarginal line composed of single spots. In the specimens of the summer-brood the hindmarginal area of the forewing as well as the hindwing are usually paler, often almost white. South-European examples also are light-coloured, yellowish white, the apical blotch of the forewing brownish yellow. North Europe to Southern France and Northern Italy, Corsica, Bukovina, Bulgaria, Armenia to East Siberia. In Central Europe everywhere plentiful, *webbiana.* in 2 broods, April—May and July—August. A dark form occurs also in this species, ab. **webbiana** *Rebel*, corresponding to ab. *tristis* of *P. anastomosis*; forewing blackish grey, traversed by 3 white transverse stripes. — *canescens.* Further, a likewise pale East-Siberian form, **canescens** *Graes.*, which is pale yellowish grey to whitish, similar to the light specimens of the summer-brood. — Egg glossy dark green, with dark pole. Larva grey, with minute dark red-brown irroration, which renders the ground-colour reddish grey, and with thin dark dorsal line and grey hair; the hump on segments 1 and 8 of abdomen low, blackish; from thoracical segment 2 on each side 3 feeble orange-yellow warts in a transverse row; stigmata black. May—June and August—September, on Salix and Poplar. Pupa as in *P. anastomosis*, in a grey web.

curtuloides. **P. curtuloides** *Ersch.* (47 f). Very close to *P. curtula*, which it replaces in Amurland. Ground-colour somewhat darker than in *curtula*, uniformly reddish brown, the dark apical patch on the forewing likewise more even, the prominent white band which forms its proximal border produced into a long pointed tooth. — In Amurland, plentiful. The larva on Aspen. — It is not certain if the North-American *albosigma* belongs here.

anachoreta. **P. anachoreta** *F.* (= curtula *Esp.*, fulgurita *Walk.*) (47 g). Ground-colour dark brownish grey, more ashy grey, vertex and centre of thorax black-brown. The dark brown apical spot of the forewing extends basad beyond the postdiscal band to the apex of cell, the white band within it sharply contrasting and dentate; the other bands indistinct. In the apical patch a row of small blackish submarginal spots, the row continued below vein 3 by larger and more prominent spots. From North Europe, with the exception of the higher latitudes, to Northern Italy and Northern Spain, Southern Russia, Armenia, East Asia, China, Japan, India. In Central Europe everywhere, but rarer than *curtula* and *anastomosis*, likewise in 2 broods, April—May and July—August; in the North one brood, May—June. — Also in this species a paler variety has been separated: **pallida** *Walk.*, *pallida.* which extends from Central and East Asia into the Oriental Region. — Egg lentiform, brown-grey with brown transverse band. Larva reddish grey, with grey yellow hair, dark dorsal line and large, interrupted black dorsolateral spots. The tubercle on abdominal segment 1 moderately high, that on segment 8 smaller, brown-red bordered with black, the former accompanied by a prominent white spot. The small orange-red lateral warts weak as in *P. curtula*, with which the larva agrees in habits. Pupa rather slender, glossy black-brown, with the segmental incisions of the abdomen red-brown, the apex as in *P. anastomosis*. Cocoon loose, brownish grey, between leaves.

P. pigra *Hufn.* (= reclusa *F.*) (56d). Smaller than *P. anachoreta*, with the ground-colour darker; *pigra.* the forewing strongly suffused with whitish grey to violet grey, particularly in the centre and at the distal margin; the 3 bands are represented by 3 prominent white lines. Subbasal and prediscal bands approach each other costally and are united at the hind margin. A red-brown spot between postdiscal band and apex of wing. Throughout Europe (excepting the Polar Region) to Portugal and Central Italy, South-Eastern Europe, South Russia, Armenia, Central and East Asia. In Central Europe rarer than *anachoreta* and the other species; likewise in 2 broods. — Also of this species a lighter variety and a darker one occur: **obscurior** *Stgr.*, *obscurior.* with the ground-colour very deep dark brown, is found in Central and East Asia; and **ferruginea** *Stgr.*, with *ferruginea.* the ground bright rust-brown, has been described from southern Asia Minor. — Egg semiglobular, flesh-colour. Larva ashy grey to blackish grey, or with a greenish tint, hair grey-yellow, the hump on segments 1 and 8 of abdomen flat, black; 2 longitudinal rows of yellow lateral small warts in dark spots, also a ventro-lateral, yellow, interrupted double stripe, in which the black spiracles are placed. On Salix and Aspen. Pupa glossy red-brown with dark wing-cases, otherwise as in *P. anastomosis*, etc., in a whitish grey web.

P. modesta *Stgr.* (= moderata *Graes.*, Rhegmatophila akulini *Oberth.*) (47 f). Forewing pale ashy *modesta.* grey, dusted with blackish scales, without apical patch; subbasal and prediscal bands not very distinct, the white postdiscal band, however, sharp, dentate, edged with black, distally accompanied at the costal margin by an obsolescent brown macular stripe. Hindwing dirty white, sparsely irrorated with black scales at the distal margin. — The species bears some resemblance to ab. *pallida* of *P. anachoreta*, but is easily distinguished by the absence of the apical spot. Central Asia (Ferghana and Issyk-kul, Alexander Mts.).

40. Genus: **Pygopteryx** *Stgr.*

Antennae serrate in ♂ with short cilia, simple and setiform in ♀. Palpi rather long, distinctly extending above the frons. Proboscis strongly developed. Thorax with smooth hair, only the hair at the posterior corner of the patagia somewhat rough, semierect. Abdomen with short smooth hair, with long anal brush in ♂. Femora and tibiae with long hair; hind tibia with strong mid- and end-spurs. Forewing rather broad, with pointed apex and undulate distal margin which projects strongest in the centre. Hindwing broadly rounded, vein 5 weak, a mere fold.

The only species is **P. suava** *Stgr.* (47 g), which recalls *Pygaera* by the wing-markings. Dull reddish *suava.* brown; forewing darker at the base and distal margin, centre of costal margin lighter, reddish grey; with 3 straight light transverse bands in the usual position, and a light submarginal line. Hindwing light reddish brown, with a strongly obsolescent narrow dark median band. — Ussuri district (Vladivostok, Sidemi).

41. Genus: **Anticyra** *Walk.*

Antennae plumose to $\frac{2}{3}$ in ♂, the branches densely hairy on two sides, in ♀ thick setiform. Palpi porrect, not reaching above frons. Proboscis feebly developed. Eyes naked. Thorax as in *Phalera* relatively very short. Abdomen elongate, extending by $\frac{1}{3}$ beyond the anal angle of hindwing. Femora and tibiae with dense and long hair; hind tibia with mid- and end-spurs. Forewing broad, triangular, distal margin steep, hind angle rounded; veins 6, 7, 8, 9 stalked together, 10 from cell, touching stalk of 8, 9 in a point or connected with it by a bar, a long areole being formed. Hindwing broad and evenly rounded, veins 6 and 7 stalked. — Distributed throughout the Oriental and Ethiopian Regions.

A. combusta *Walk.* (47 e). The species varies somewhat in colouring, but the markings are surprisingly *combusta.* constant considering its wide distribution. It reminds one of the European species of *Phalera*, particularly in the colouring of the thorax. The straw-coloured forewing are traversed in the costal area by dark grey-brown longitudinal stripes, mostly parallel with the veins, the whole distal marginal area is strongly darkened, this brown colouring extends below the cell to the base; at the distal edge a double row of black, proximally a pale-edged angle-spots. Hindwing dark brown with pale basal area. — Throughout China to Tsingtau and Pekin and singly in Southern Japan. The only Oriental representative of the genus, occurring all over India from the Himalayas to the Sunda Islands and the Philippines, being also widely distributed in Africa. Larva bluish green, with black head, hair long, especially dense and rather long on the abdomen. Pupa short and stout, with a tuft of bristles at the anal end.

42. Genus: **Pydna** *Walk.* (Bireta *Walk.*, Ceira *Walk.*)

Antennae of ♂ plumose, the branches moderately long, somewhat extraordinary long, in other cases but short; in ♀ with short pectinations or simply setiform. Palpi obliquely upturned to a level with the vertex, in one group of species shorter, the end-segment acute, porrect. Proboscis rather weak. Eyes naked. Thorax with long hair, particularly the patagia. Abdomen rather long, especially slender and tapering in ♂. Legs long and strong; femora and tibiae with crests of long hair; hind tibia with very strong mid- and end-spurs, the end-spurs of the midtibia also very strong. Forewing broad, particularly broad at the base in consequence of the costal and hind margins being strongly convex at the base, the wing appearing quadrangular; distal margin steep and only slightly convex, hind margin quite straight beyond the basal convexity; veins 6, 7, 8, 9 on a stalk from the upper angle of cell, 6 very close to cell, 10 from cell, anastomosing with stalk of 8, 9 or of 7, 8, 9, the areole being consequently either remarkably long and narrow or shorter. Hindwing very broad, strongly rounded, with the costal margin almost straight; veins 6 and 7 stalked. — The genus is rather rich in species and occurs throughout the Oriental Region, extending in East Asia to China and Japan. But most species are tropical. Colouring and markings are liable to very much. The East Asiatic species are all closely related to one another.

pallida. **P. pallida** *Butl.* (= notata *Swinh.*) (56 e). Ground-colour of thorax and wings pale yellowish grey, the forewing with a broad but diffuse brown longitudinal stripe in the costal half sharply bounded by the hind margin of the cell, and with a large brown hindmarginal spot; beyond the centre a curved double row of dark brown dots from costal to hind margin, likewise before the distal margin a row of black-brown dots between the veins; some additional dots at the base and before the middle. The brown markings as well as the rows of dots are sometimes quite obsolescent (cf. figure), especially in ♀, only the marginal dots remain distinct, at least in the centre of the distal margin. Hindwing brownish with the exception of the costal margin, sometimes entirely pale. Abdomen light grey-brown. — North India to China and Japan.

straminea. **P. straminea** *Moore* (47 g, as pallida). Forewing entirely pale or rather bright straw-yellow to brownish yellow; a brown stripe from the apex to the middle of the hind margin, more or less continuous or broken up into irregular spots, and strongly dilated below the cell; this stripe traversed by a postdiscal double row of brown spots arranged as in *P. pallida*: at the distal margin a row of brown dots between the veins. at the apex of cell a brown spot and before it a vestigial prediscal row of spots. Also in this species the markings are liable to being quite diffuse or disappearing almost entirely excepting traces of the outer postdiscal row of dots and the marginal dots. Hindwing pale yellowish grey. Body of the colour of the forewing. — Japan. If a larger series of Japanese specimens be examined, some aberrations might be distinguished in this very variable species, although the forms do not appear to be sharply defined.

plumosa. **P. plumosa** *Leech* (49 a). Somewhat resembling the two previous species in colouring and marking. The ♂-antenna with excessively long branches. Forewing pale straw-colour, with a brown shadow from the apex to the hind margin; the postdiscal and marginal rows of dots as in weakly marked specimens of *P. straminea*. Hindwing silky white with a slight yellowish tint. — Japan.

southerlandi. **P. southerlandi** *Holl.* Antennae very strongly pectinated. Forewing light straw-yellow; from the base below cell a curved brown band extends upwards to the apex. Hindwing somewhat darker than forewing. — Japan.

insignis. **P. insignis** *Leech.* According to the description closely related to *pallida Butl.* Forewing pale yellow basal, median and outer areas brownish, 2 black basal dots, a prediscal transverse row of black spots, behind the dark discal spot an undulate double line spotted with black on the veins. at the distal margin a row of black dots between the veins, the tips of the veins also brown. Hindwing dark brown with exception of the costal margin. — Japan.

frugalis. **P. frugalis** *Leech.* Forewing pale brownish, with blackish basal spots; in the cell a brown longitudinal stripe which encloses in its dilated apex the dark discal spots; a brown longitudinal stripe extends from the apex of wing to below cell, being continued from there to the hind margin by two curved lines; the two postdiscalrows of spots and the marginal interneural dots are sharply developed in this species also. Hindwing pale brownish. — West China.

43. Genus: **Norraca** *Moore.*

Antennae serrate in ♂, with fascicles of fine cilia, in ♀ smooth, setiform. Palpi of ♂ vertically upturned, reached to the height of vertex, more obliquely upturned in ♀ and somewhat shorter. Proboscis moderate.

Eyes naked. Thorax with smooth hair. Abdomen of ♂ slender and very long, almost extending for one half beyond anal angle of hindwing, ending in a tuft of hair prolonged to a point; in ♀ stouter, with tuft of hair. Femora and tibiae with dense long hair, especially the fore tibia of ♂ very densely hairy, appearing broadly spindle-shaped. Hind tibiae with mid- and end-spurs. Forewing long and very narrow, costal margin almost straight, hind margin dilated at the base into a broad triangular lobe, apex slightly rounded in ♂, produced into a point in ♀; distal margin strongly receding, not separated from hind margin; vein 6 free from upper angle of cell, close before it 7, 8, 9 on a common stalk, 10 from cell, immediately beyond base of 7 anastomosing for a longer distance with 8, 9, a short narrow areole being formed. Hindwing rounded-triangular, costal margin almost straight, veins 6 and 7 stalked, 8 running close along cell for a considerable distance.

The genus appears to be restricted to South and East Asia; for it seems to me doubtful that the two species described from Africa as *Norraca* belong here. The genotype, *N. longipennis Moore*, described from Malacca (Pulo Penang) has remained the only species known from Southern Asia; it occurs also in China. A second species described from East China is presumably identical with it.

N. longipennis *Moore* (47 g ♀, erroneously named *straminea*). (= ? retrofusca *Joann.*). Wings pale *longipennis.* yellowish brown, with a grey tone and in places, especially in ♀, with a reddish flush. ♂ with an elongate, diffuse, whitish spot before apex of cell. Behind the centre a slightly curved row of 8 thin black dots on veins 1—8 parallel with the margin, beyond it two blackish stripes likewise parallel with margin, very indistinct and composed of single short streaks. South Asia, Ceylon and Malacca, China. *N. retrofusca Joann.* from Kiang-Nan. — Dr. SEITZ communicates the following observations: The moth rests with the wings close wrapped round the body, the insect thus resembling to some extent a cigar, and holds on to the stalks of bamboo only with the forelegs, the other legs being held close to the body. In this position the insect pendulates in the wind, being so similar in appearance to a yellow blade of bamboo that one recognises it as an insect only if one touches it. When the bamboo is beaten over an umbrella, the specimen falls down with the wings closed and rolls about in the umbrella. The species flies late at night, the ♂♂ coming to the lamp. It may be concluded from the special adaptation of the moth to bamboo that this is the food-plant of the caterpillar.

44. Genus: **Gazalina** *Walk.*

Antennae in ♂ with moderately long pectinations to the tip, in ♀ only dentate. Palpi remarkably small, short, stumpy. Proboscis vestigial. Eyes naked. Thorax with very long hair. Abdomen rather long-hairy, at least in ♂, in ♀ with a remarkably strong club-shaped anal tuft composed of hairs and scales. Forewing broad, triangular, costal margin almost straight, distal margin moderately oblique and slightly curved, forming a distinct angle with the hind margin; veins 6, 7, 8, 9, 10 stalked together, 6 close to cell, the fork 8,9 exceedingly short, close to costal margin, 10 originating between 6 and 7; no areole. Hindwing broad, rounded, Femora and tibiae long-hairy; hind tibiae with very short end-spurs. Himalayas and North India.

Gazalina has hitherto been united with the *Lymantriidae*, to which the genus bears an evident resemblance in facies. The woolly body, the thick anal tuft of the ♀ and the white colouring of the wings appear to point to a relationship with the Lymantriids, quite apart from the reduced palpi and the absence of the proboscis. However, a glance at the neuration proves that the genus is not allied to the Lymantriids, but must be placed with the Notodonts.

P. apsara *Moore* (= nervosa *Feld.*) (48 d). Thorax and wings white, the latter with a silky gloss, antennae, *apsara.* frons, legs and abdomen black-brown, the thick club-shaped anal tuft of ♀ bright glossy golden; veins in the distal half of forewing black. North-Western Himalayas and North India. — In the North-Indian **venosata** *Walk.* *venosata.* the entire veins of the forewing and those of the hindwing at least in the costal half blackish.

P. chrysolopha *Koll.* (= antica *Walk.*, chordigera *Feld.*) (48 e, d). Differs from *apsara* in the markings *chrysolopha.* of the forewing, which bears, besides the black veins, 3 black transverse lines, one basal, the second prediscal and the third discal, the last running in the direction of the discocellular vein. Abdomen of ♂ more extended yellowish at the incision than in *aspara*. — Kashmir, North-Western Himalayas to Sikkim.

45. Genus: **Gelastocera** *Butl.*

The affinities of this genus are still entirely unknown. One Japanese species has been described. Antenna of ♂ with long pectinations to $^{3}/_{5}$, the rest only with very short cilia. Palpi slightly extending above frons. Abdomen very slender.

G. exusta *Butl.* (= Microleon rubicundula *Wilem.*) (46 h). Head and thorax reddish, antennae brown, *exusta.* abdomen whitish. Forewing red-brown, with broad median band which is widened at hind margin, distal marginal area dirty yellowish brown. Hindwing whitish, with the distal margin slightly brownish. Japan (Hakodate). — Lately the species has been placed by HAMPSON as congeneric with *Earias ochroleucana Stgr.* into the Noctuid-group *Acontianae*.

Alphabetical List

of the Palearctic forms of Notodontidae with references to the original descriptions.

* signifies that the species is figured at the place cited.

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albida Leuc. *Bdv.* Icon. Hist. Lep. *
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aliena Not. *Stgr.* Rom. Mém. Lép. 6, p. 352. *
alpherakyi Phal. *Leech,* Trans. Ent. Soc. Lond. 1898, p. 229.
alpina Rheg. *Bell.* Ann. Soc. Ent. Fr. 1880. p. 367. *
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18. Family: Cymatophoridæ.

The one characteristic by which, as a Family, the *Cymatophoridae* are differentiated from all others is found in the neuration of the hindwings of the imago; vein 7 rises towards the end of cell and approximates to vein 8, which is curved down towards it, sometimes so closely as to appear to anastomose, herein resembling the neuration of the *Pyralidina*. Inter se the genera vary little in neuration; vein 6 of forewing in some cases rises from upper angle of cell, in others is stalked with 7, 8; sometimes an areole is formed by the anastomosis of 8 and 9. As far as our present knowledge goes the family is divisible into 3 groups which have no very close connection with one another. In the first, which includes the well known species of *Habrosyne* and *Thyatira*, the larvae feed, when young, exposed on species of Rubus, afterwards concealing themselves among the herbage; in the second, containing among others the genera *Polyploca* and *Palimpsestis*, they pass their lives within the protection of spun or rolled together leaves of trees, such as poplar, birch, oak, and alder; of dull coloration, the dorsal surface often darker than the ventral, somewhat flabby of consistence, smooth and flattened, with large globose head, resting by day when not feeding curled up head to tail; on the contrary the larvae of the first group have, as in *Thyatira*, the dorsum humped on segments 6—10, the third segment with a bifid projection, particoloured, with lateral stripes, and resting rigid, with the front and hind segments raised; while in *Habrosyne* they are cylindrical, smooth, yellow brown in colour, with white lateral spots on one or more segments; in the third group the larvae are at present unknown, though those of one genus, *Epicimelia*, are reasonably suspected of being attached to Astragalus. All alike have but one generation in the year, the larvae feeding up in summer and autumn, and appearing as imagos in the following spring or summer. Pupation takes place in a spun cocoon among leaves on the surface of the ground. The imagos are smoothly and finely scaled; in the first group of gay appearance, adorned with bright lines and blotches; in the second comparatively dull, traversed by dark lines and bands; and in the third pink, with a metallic or yellow stigma.

1. Genus: **Lithocharis** *gen. nov.*

Tongue present; frons smooth; palpi upturned, rather short, the second segment broad, thickly scaled, the third short, smoother; antennae of ♂ smooth, flattened, lamellate; thorax stiffly scaled; abdomen smoothly scaled; pectus rather woolly; tibiae smooth; forewing elongate, more than twice as long as wide; costa strongly shouldered at base, then nearly straight; apex subacute; termen smooth, curving very obliquely below middle into the inner margin without forming an angle; hindwing broadly triangular; both wings finely and smoothly scaled; discocellular of forewing inangled; vein 5 from the angle; vein 6 stalked with 7, 8; vein 3 from before end of cell; in hindwing veins 3, 4 from lower end of cell, 5 from near middle of discocellular. Type *L. albibasis Hmps.* from India.

L. maxima *Leech* (49 h). Forewing grey brown tinged with violet; base narrowly white edged externally *maxima.* with yellow; a narrow oblique white dash at apex; orbicular and reniform stigmata represented by small tufts of raised whitish scales; traces of inner and double outer dark vertical lines, the teeth marked by dark dashes on veins; subterminal line obscurely paler, denticulate; hindwing pale ochreous grey, with darker grey outer band and broad terminal border. Japan. Distinguished from the Indian form by the absence of any pale costal streak.

2. Genus: **Saronaga** *Moore.*

Tongue well-developed; frons smooth; palpi porrect, the second segment thickly scaled, the third quite short and smooth; the antennae of ♂ lamellate; head and thorax thickly and stiffly scaled; abdomen smooth, without dorsal crests, with a rough mantlet below of contiguous lateral tufts; pectus, femora, and tibiae woolly; forewing narrow and elongate; costa nearly straight; apex prominent; termen curved, more obliquely below middle; hindwing broad, triangular; termen rounded and slightly sinuous, the anal angle truncate; forewing with discocellular vertical, vein 5 from below its centre; vein 6 stalked with 7, 8; 9, 10 stalked; 8 anastomosing with 9 to form an areole; hindwing with vein 5 from close above 4. Type *S. albicosta Moore.*

S. consimilis *spec. nov.* (= albicosta *Leech* part nec *Moore*) (49 f). Forewing dark brown crossed by *consimilis.* darker waved lines below the median vein and up to vein 6 beyond cell; the costal area whitish, tinged in cell and above with rosy, and along costa with yellowish green; the stigmata white with deep brown outlines; the orbicular round with small red brown spot below centre; the reniform vertical and oblong, the lower part filled in with dark brown, the upper divided into 3 or 4 spots by transverse lines; the reniform followed by an irregular white patch traversed by a brown crenulate line; beyond this are three deep brown dentate outer lines, separated by paler spaces; subterminal line whitish, wavy, preceded and followed by deep brown dentate shades; a short black dash from apex; terminal line brown, lunulate; fringe pale chequered with brown; hindwing dark olive brown, with deeper curved outer line and broad terminal border; fringe white; underside dull grey with dark outer band and broad terminal border on both wings; apex of forewing with a pale blotch; head dark brown; tegulae black tipped with white; patagia olive grey, darker at base; thorax and abdomen grey; palpi white, the second segment marked above with brown. Expanse of wings: 50 mm. Distinguished from *albicosta Moore* by its smaller size, more uniform brown coloration, and rosy tinge along costal streak, as well as by the different stigmata. Described from 1 ♂ and 2 ♀♀ from Japan, in the Tring Museum.

trifolium. **S. trifolium** *Alph.* This species is said to resemble *ocularis L.* in markings generally, but the costal area is whitish tinged with rosy, as in *albicostata Brem.*, to which it is also allied by its narrower wings; characterised in particular by a large greenish trefoil-shaped stigma in cell, touching both inner and outer lines. Described from a single ♀ from Sidemi, bred from an unknown larva.

mirabilis. **S. mirabilis** *Btlr.* (55 m). Forewing pale olive brown below median vein and obliquely upwards to apex; cell and costal area chalk white; the costal edge at middle dark brown; a black spot followed by a white one close to base on submedian fold; inner line double, oblique from costa to median vein at middle of cell, black brown filled in with orange, oblique inwards below middle and indistinct; outer line similar, oblique inwards from costa before apex to end of cell, where it is deflexed, inwardly curved below middle and hardly marked; subterminal line wavy, grey, oblique and straight from apex to anal angle, outwardly followed by grey spots; a fine lunulate dark terminal line; fringe grey; faint traces of white stigmata, shown by dark spots at their lower ends; hindwing whitish, grey-tinged along termen, more broadly towards apex; fringe white. Found in Japan only, Yokohama and Gifu.

commifera. **S. commifera** *spec. nov.* (= albicosta *Leech* (part) nec *Moore*). Forewing with the lower half uniformly deeper brown than in *S. albicosta Moore*; the cell and subcostal area rosy, towards costa white tinged with yellowish green; stigmata redbrown with dark outlines, the orbicular containing 4, and the reniform 3, sulphur coloured spots, separated by a long hornshaped mark curving in below the orbicular, the reniform followed by some irregular sulphur-tinted crenulations; the denticulations of the dark line more acute, above middle alternating with white; hindwing darker, olive fuscous, the terminal border deeper; underside dull whitish tinged with grey; the veins dark; a broad fuscous terminal border in forewing, narrower and subterminal in hindwing; the termen and fringe whitish; an angulated praeapical mark and the costa itself before apex white; head deep brown; tegulae black brown with their tips white; patagia brown with their base narrowly white; thorax and abdomen fuscous brown; palpi above dark brown, below white finely speckled with brown. Expanse of wings: 46—52 mm. 1 ♂ (type), 2 ♀♀ from Sabathu, in the Punjab, N. India; the specimen mentioned by Leech from Wa-ssu-kow, W. China (Tr. E. S. 1900, p. 15) and referred by him to *albicosta Moore*, belongs to this form, as those from Japan to *consimilis*; both species have narrower forewings than *albicosta Moore*.

albicostata. **S. albicostata** *Brem.* (55 m). Forewing dull olive brownish from inner margin to median vein and beyond cell to vein 6; in cell and above mixed with whitish, pure white along middle of costa; a double broken oblique subbasal line; inner line oblique, black, outbent on both folds, inangled on the median vein and vein 1, preceded by an olive brown shade, which above median is narrowed and blackish; outer line double, the inner arm darker, angled outwards on vein 4, indented on both folds; subterminal line waved, pale grey, preceded by a dark band which is internally bordered by a lunulate dentate pale line, the teeth pointing inwards and marked with black white-tipped dashes on the veins; a strong oblique black streak from apex; an interrupted blackish terminal line; fringe grey; hindwing pale dirty grey, with darker terminal border and slight curved outer shade; extreme termen and fringe paler. Described from E. Siberia; also recorded from Corea and W. China, and from Japan.

3. Genus: **Habrosyne** *Hbn.*

Tongue present; frons smooth; palpi obliquely porrect, the second segment thickly scaled, the third short and smooth; antennae of ♂ simple, somewhat flattened; femora and tibiae hairy in ♂; the abdomen with strong lateral tufts of hair; forewing triangular, the inner margin sinuous, with a small tuft of scales at anal angle; veins 3 and 4 from lower angle, 5 from near above 4; 6 stalked with 7, 8; 9, 10 stalked, 11 free. Larva feeding exposed when young, afterwards under the shelter of united leaves, pupating in a slight spun cocoon among leaves. Type *H. derasa L.*

derasa. **H. derasa** *L.* (49 d). Forewing with basal area olive green, the rest pearl grey tinged with ferruginous yellow; a diffuse whitish patch along middle of costa, marked with 3 or 4 oblique dull ferruginous lines; a short oblique streak of shining white raised scales across submedian fold near base; projecting above median vein, which is marked with white, to meet the oblique inner line which is white from $^1/_4$ of costa to $^2/_3$ of inner margin; a diffuse white subterminal streak, slightly curved from apex to anal angle, widening towards costa; space between the lines tinged with ferruginous, the 4 costal lines reappearing, strongly zigzag, in outer half below vein 6; orbicular and reniform stigmata ferruginous outlined with pale, the reniform with the centre pale; hindwing fuscous. Larva cinnamon brown, yellower at sides, with a lateral row of obscure dark stripes; a white round lateral spot on segment 4, sometimes repeated on 5 and 6; on bramble. Occurs throughout Europe and in Western Asia.

intermedia. **H. intermedia** *Brem.* Of the same size and shape as *derasa*, but in coloration and markings resembling *scripta Gosse* (49 d) from N. America, from which it is doubtfully distinct; both are distinguished by the absence of ferruginous coloration, and the presence of a white blotch in the angle between the subbasal and inner lines above the white part of the median vein. Found in Amurland only.

derasoides. **H. derasoides** *Btlr.* (= fraterna *Moore*) (55 m). Resembles *derasa L.* in colour, and in shape of wings; distinguished by the presence of the white blotch in the angle above the white part of the median vein. Butler's type was from Hakodate, Japan; *fraterna Moore* from Dharmsala in the Punjab.

indica. **H. indica** *Moore* (55 n). Always larger and darker ferruginous than *derasa*; the termen more oblique and the apex more prominent; the upper part of the median area below the white costal patch much darker, extending thus to apex, the white subterminal stripe straighter, but curved into apex shortly before costa; hindwing always darker fuscous. Moore described his Indian species from Sikkim, but the larger Japanese specimens, generally referred to *derasa*, and those from Kashmir, are identical; the form **pterographa** *Pouj.* is merely a darker, less ferruginous insect, found in W. China. *pterographa.*

conscripta. **H. conscripta** *spec. nov.* (55 n). As large and of the same shape as the last species, *indica*, but in coloration agreeing with *intermedia Brem.* and its American cousin *scripta Gosse*, which it further resembles in having the white triangular patch above median vein between the subbasal and inner lines. 1 ♀ Wa-ssu-kow, 1 ♂ Ta-tsien-lu, (type) in Tring Museum; also a short series in the British Museum Collection from Yatong, Tibet.

dieckmanni. **H. dieckmanni** *Graes.* (49 d). Forewing a mixture of reddish violet, olive brown, and yellow brown; lines sinuous and wavy; a sharply marked small white oblique streak near the base from median vein to vein 1; a broad fascia across wing, limited on each side by fine wavy lines, broad at costa, but only occupying a third of inner margin; before it two fine brown wavy lines and a violet stripe, the last swelling out on costa into a large violet blotch; near it at base a small brown spot; the large basal triangle uniform olive brown; beyond the fascia, but clear only to vein 6, two or three wavy lines followed by a pale stripe; apical area filled with a black brown shade containing on costa a violet wisp; the fascia itself yellow brown, greyer towards inner margin; stigmata plain, edged with reddish; the reniform with a yellow or red centre; costal streak violet red, interrupted by grey brown shadings and before the reniform by two black streaks; terminal area purplish red above vein 1; a roundish blotch of olive brown at anal angle, traversed by an olive brown terminal line; terminal lunules brown, edged by a violet line; hindwing dark grey; veins black at extremity before the yellow fringe. Larva cinnamon brown, yellower at sides; on each segment at sides a large round pale yellow spot, reaching higher up the dorsum on segments 2 and 3; some small yellowish dots above the feet; head orange and brown; feeding on bramble. Amurland.

4. Genus: **Thyatira** *Hbn.*

Tongue present; frons smooth; palpi obliquely porrect, the first two segments thickly fringed with hair, the third smooth; antennae of ♂ ciliated; third segment of dorsum crested; forewings with vein 6 from upper angle of cell; otherwise the neuration is the same as in *Habrosyne*; ground colour of forewing dark, ornamented with large roundish pale spots tinged with pink or brownish. Larva feeding, when young, exposed; dorsum humped on segments 6—10; the third with a bifid projection; rests rigid, with the two extremities raised. Type *T. batis L.*

batis. **T. batis** *L.* (49 e). Forewing deep olive brown, with 5 rounded whitish blotches suffused, except at their margins, with peach blossom colour; the basal large, marked with one or two brownish spots; that at middle of inner margin small, irregularly semicircular; two at costa, beyond middle and at apex; the fifth at anal angle, with a small white terminal spot beyond its upper margin; two indistinct wavy dark outer lines; hindwing fuscous; In the Punjab, along with the type form, occurs also the ab. **cognata** *Moore* (49 e); in this the pale blotches present usually a dull blurred appearance, while that on inner margin is wholly absent; the brown ground colour is generally paler, so that the transverse dark lines are more in evidence, especially the outer line, which is bordered with pale grey. In the ab. **confluens** *Reuter* (= juncta *Tutt*) the apical and praeapical blotches are coalescent. — Larva brown, second and third segments whitish, fifth with 3 black spots; a row of oblique dark lateral stripes; when young easily mistaken for a bird's dropping; feeds on common bramble. Through- *confluens.*

out Europe, North and Central Asia, to China and Japan; also occurs in N. India. The examples from China and Japan are always larger than the European.

trimaculata. **T. trimaculata** *Brem.* (49 e). Forewing deep olive brown overlaid with dense black speckling; three large white rounded blotches, their centres suffused with brownish pink; the largest occupying the base, a smaller one at apex and anal angle; terminal pinkish white, brown-filled lunules along termen between the blotches; fringe brown, pink at apex and anal angle; hindwing whitish, with grey cell-spot, sinuous outer line and diffuse terminal border, the extreme termen and fringe whitish; head and collar black; tegulae white; patagia white at base, then brownish. Amurland.

stramineata. **T. stramineata** *spec. nov.* (= flavida *Leech* (part) nec *Btlr.*) (55 n). Forewing olive grey with the wavy lines blackish; an oblong whitish basal patch, running bluntly outwards above vein 1 across base of cell; a large rounded white patch at apex; a smaller one at middle of costa and a flattened one at anal angle; inner line bigeminate, outcurved at middle; outer line double, followed on costa by two short white strigae; stigmata pale, with dark outlines; the orbicular dotlike, the reniform oblong, vertical; subterminal line lunulate-dentate, the teeth white-tipped basewards; terminal black lunules filled in with paler; fringe olive brown; hindwing straw yellow, with broad blackish terminal border in apical half, becoming narrower and subterminal below; the fringe and extreme termen straw colour. A large and conspicuous insect; the type from the Khasia Hills, Assam; the specimen from Ichang, Central China, referred by Leech (Tr. E. S. 1900, p. 11) to *flavida Btlr.* and now in the British Museum Collection, is identical.

flavida. **T. flavida** *Btlr.* Considerably smaller than *stramineata* and much duller, the hindwing suffused with dull brownish grey. Described from a single ♂ from Hakodate, Japan.

oblonga. **T. oblonga** *Pouj.* (= flavida *Leech* (part) nec *Btlr.*). Forewing dark greyish fuscous with wavy cross lines; basal patch small, projecting in middle somewhat in the shape of a duck's beak; a small white spot at middle of costa beyond rise of outer line; a large and a small white spot on inner margin, often united; an oblique rounded white apical patch, and a small flattened anal patch; the wavy dark transverse lines alternated with paler spaces; the outer and subterminal lines edged with grey; terminal lunules dark with grey edges; fringe brown; hindwing fuscous tinged with luteous, especially in the ♂; a darker obscurely marked subterminal band. Found in W. China.

flavimargo. **T. flavimargo** *Leech.* Forewing fuscous brown, traversed by several darker and paler wavy lines; a purplish brown spot at base of wing, this colour extending also over the thorax; reniform stigma outlined with blackish; a round pinkish white spot above it, and a larger curved spot towards apex, outwardly edged with black; on middle of inner margin a narrow erect whitish spot, and towards anal angle a round ochreous one inwardly edged with whitish; fringe brown beyond a sinuous black terminal line; hindwing fuliginous, the termen bordered with orange yellow in the ♀; fringe orange yellow in both sexes; underside of wings fuliginous with yellow median bands and terminal borders. W. China: Omei-shan; Pu-tsu-fong; Chia-kou-ho.

conspicua. **T. conspicua** *Leech.* Forewing pale fuscous brown, traversed by faint wavy lines; an irregularly shaped white basal patch, marked with black spots and outlined with black; stigmata white outlined with black; a large white patch at middle of costa traversed by short dark lines; another towards apex preceded and followed by black lines; on the outer part of inner margin some smaller white spots with black outlines; hindwing yellowish, with a blackish subterminal band, outwardly diffuse; fringe yellowish; two black spots at outer angle; underside yellowish with black median and terminal markings. Described from 2 ♂♂ from Chia-kou-ho and Pu-tsu-fong, West China.

hedemanni. **T. hedemanni** *Christ.* (49 d). Forewing greyish olive, darker in median area; basal patch dull whitish, tinged below median vein with olive brown; the blotches before apex and at anal angle dull grey tinged with pink; before the apical blotch a deep olive costal triangle; outer line forming the limit of the blotches and projecting outwards as a crenulate line between them; subterminal line obscurely dentate lunulate; reniform stigma obscure; hindwing pale olive fuscous. Transcaucasia.

violacea. **T. violacea** *Fixs.* (49 e). Forewing olive brown mixed in parts with bluish slate-colour; a large slate-coloured basal blotch, shortly and narrowly projecting in middle, tinged with dark olive at costa and yellowish olive below median, and containing a short oblique white dash from vein 1 to median vein; stigmata deep olive brown, round, with white contiguous annuli; above the reniform two inwardly oblique short dark streaks in the midst of a pale slate-coloured costal patch; these streaks reappear beyond cell between veins 6 and 2 as two lunulate dark outer lines edged with a white line, this last alone continued to inner margin as the edge of a slate coloured anal blotch, the inner half of which is olive yellow; the dark olive terminal area is interrupted by a wide diffuse slate-coloured streak from apex; subterminal line marked at its origin on costa by a white curved striga; a black festooned terminal line followed by a row of narrow white terminal lunules filled up with deep olive; fringe deep olive, rayed with white beyond veins; hindwing glossy slaty olive, with a faint paler outer band; the fringe whitish. Described from Corea, found also in West and Central China.

T. möllendorffi *Fixs.* (49 d). It seems to me that Fixsen was premature in sinking his species to *aurorina Btlr.* The forewing is much less strongly coloured, the pale and dark shades being less contrasted; the basal patch is smaller, with less rounded outline; the pale markings in the terminal area are straighter and more linear, and vein 1 is marked with white; hindwing likewise not so dark. *Aurorina* is a Japanese species only; *möllendorffi* is from Corea. *möllendorffi.*

T. aurorina *Btlr.* (49 e). Forewing olive tinged with purplish red in places; a rounded pure olive blotch at base edged by a velvety black line curved from costa to submedian fold, then oblique to vein 1 and running in basewards to inner margin; within the black limiting line the edge is yellow below costa, projecting yellow streaks to base along costa and subcostal vein; below subcostal white, projecting a white streak along median, meeting a pearly white oblique dash from vein 1; in the purplish tinged central fascia are two black lines inwardly, plainest at each extremity; outer line treble, oblique inwards above subcostal in the pale costal blotch above the stigmata, reappearing below vein 6 beyond cell as 3 and ultimately 5 waved lines interrupted at submedian fold; followed at costa by an inwardly oblique shining yellow streak and below submedian fold by a curved white black-edged line which forms externally the limit of a round olive blotch at anal angle, tinged in its inner half with purplish; stigmata purple with pale annuli, the reniform with a pale linear centre; a purple oblique shade from costa before apex containing a curved yellow streak; a pearly white curved space from apex to above anal angle, followed by 4 purple blotches between veins 2 and 6; terminal lunules yellow filled up with brown, preceded by a dentate dark line edged with white from vein 2 to 6; fringe brown, rayed with yellow and white-tipped; hindwing olive fuscous; the fringe pink, white at tips. Japan. *aurorina.*

The 5 following species have longer and narrower forewings.

T. apicalis *Leech.* Forewing pale olive grey; median area deeper, with a small pale costal patch beyond the origin of outer line; basal patch whiter, small, rounded, with dull brown clouds below median vein and vein 1; a pale creamy white blotch at apex, inwardly bounded by the dentate submarginal line, which runs obliquely and forms also the boundary of the anal patch, which is larger and nearly filled with brown; a row of pale dark-edged terminal lunules; fringe olive grey; hindwing pale olive grey; basal half limited by a darker curved line, followed by paler, which again becomes darker towards termen. Near *aurorina*, but smaller and more delicate; described from a single ♂ from Nitou, W. China. *apicalis.*

T. tenuis *Hmps.* Forewing fuscous; the basal area greyish, bounded by an obliquely sinuous line; an ill-defined sinuous grey line from lower angle of cell to inner margin; an irregular grey subterminal line met by an oblique dark mark from apex; orbicular and reniform stigmata small, grey, edged with black; hindwing grey. Described from a ♀ only from Yatong, Tibet. *tenuis.*

T. ornata *Leech* (49 n). Forewing olivaceous brown; stigmata with black outlines; an oblong white streak from base of costa, thicker at base, to the dark inner line, irregularly deflexed at end and forming the inner margin of that line; the upper and lower edges of the blotch diffusely dark olive; outer line blackish, elbowed below costa, then nearly straight and slightly oblique to inner margin, bordered by a diffuse white space; subterminal line wavy, whitish tinged with pink, expanding towards apex; a whitish pink-tinged costal space above reniform stigma; a row of black pale-edged terminal lunules; fringe olive chequered with white; hindwing fuscous, with a faint dusky median line. Allied to *T. opalescens Alph.*, which also occurs in Western China. *ornata.*

T. opalescens *Alph.* (49 n). Forewing pale olive brown with a slight slate coloured tinge; a white somewhat flattened semicircular streak from base, its ends resting on the submedian fold, the upper and lower edges diffusely dark olive; submarginal line broad and white, curving inwards from apex to vein 6, along which it is shortly outbent, thence oblique, parallel to termen, to vein 2, along which it is deflected inwards, then again oblique to vein 1, where it is recurved to inner margin; stigmata of the ground colour, with dark outlines; beyond the reniform a whitish costal patch, before which a very obscure dark outer line rises, sloping outwards to vein 6, then outcurved to the elbow in submarginal line; the space within the elbow at anal angle white tinged with brownish; fringe brown chequered with white; hindwing greyish white. Ta-tsien-lu, Western China. The last two species are closely allied to the Indian species *undulans Hmps.* *opalescens.*

T. pryeri *Btlr.* Forewing dull grey brown; an oblong whitish blotch from base above submedian fold, containing one or two black dots at base, and between the median vein and the fold tinged with brownish, touching at its extremity a second oblong blotch along costa, bounded by the dark outer line; costal area at base deep olive brown; a long oblique apical whitish blotch, preceded on costa by a deep olive brown blotch; subterminal line dentate, pale, preceded by a dark shade; anal blotch dull brick red; terminal lunules brick red edged with black; fringe brick red, rayed with dark; hindwing fuscous; fringe rufous. Japan. *pryeri.*

5. Genus: **Gaurena** *Walk.*

Tongue present; frons smooth, but like the vertex clothed with rough hairs; palpi obliquely porrect, the second segment densely hairy beneath, the third smooth, moderately long, depressed; antennae flattened, lamellate, with close fitting clavate teeth, broader in the ♂; tegulae and patagia long-haired, the hairs of the latter tipped with scales, forming a kind of crest; metathorax, basal, and third segments of dorsum crested; pectus and femora woolly; forewing olive with pale golden yellow bands and blotches; vein 6 stalked with 7, 8; vein 5 in both wings from a little below the middle of discocellular. Type *G. florens Walk.* Mainly an Indian genus, but occurring also in China and Japan.

florens. **G. florens** *Walk.* (49 e). Forewing dark olive, with a yellow green undertone, which shows chiefly in, beyond, and below cell; a pale golden yellow curved band near base, projecting outwards between vein 1 and the subcostal, on both of which it is angled inwards; outer band restricted to patches on costa and inner margin, interrupted between veins 6 and 2; the central space contains two groups, each of three wavy dark lines, which on vein 2 in part, and along vein 1 are marked by alternate pale yellow and dark strigae, the lower half of submedian interval and the inner margin below vein 1 being pale golden yellow; a smaller yellowish white apical blotch, with 4 white dots on the veins below it; a double pale golden yellow patch at termen between veins 2 and 4; a white dot near base in submedian fold, another in place of the orbicular stigma, and a large yellowish white, somewhat glossy, round spot on discocellular; a row of white olive-edged terminal lunules; fringe yellowish olive mottled with whitish and deeper olive; hindwing olive fuscous, slightly bronzy; fringe paler, beyond a dull row of pale terminal lunules. The species is recorded by Leech from W. China; in Sikkim, whence it was in the first instance described, it is very common.

florescens. **G. florescens** *Walk.* (56 a). Forewing olive brown, more uniformly dark than *G. florens*; all the veins spotted with pale yellow in places between the dark lines; the subbasal band reduced to two roundish yellowish white blotches, one at base of costa, the other in submedian interval; the outer band reduced to a similar blotch below costa and another above vein 1 before anal angle; the apical blotch formed of two coalescing round blotches; the reniform another similar blotch; the white spot near base of submedian fold, and the orbicular spot larger; the subterminal row of spots more numerous and prominent; all the larger blotches, as well as the smaller terminal blotch between veins 2 and 4, clouded with sulphur yellow; the white marginal lunules stronger; the fringe darker, more regularly mottled with olive yellow; hindwing olive fuscous. Found at Pu-tsu-fong, W. China; like *florens*, common in Sikkim, N. India.

gemella. **G. gemella** *Leech* (56 a). Differs from *florescens* in the ground colour being deep brown, and all the blotches white, that representing the orbicular stigma larger. W. China only.

sinuata. **G. sinuata** *spec. nov.* (= aurofasciata *Leech* nec *Hmps.*) (56 a). Intermediate between *florens Walk.* and *aurofasciata Hmps.*, resembling the latter in having the pale marginal blotches conjoined by pale bands, but the outer band instead of being straight and vertical is sinuous, oblique outwards from costa, where it is not swollen into a triangle, to vein 5, then oblique inwards, edged internally by a regularly lunulate dentate line to the pale anal blotch; the apical pale blotch smaller, not reaching apex; the yellow terminal lunules complete; reniform mark large and shining as in *aurofasciata*, preceded by a small orbicular yellow dot, as in *florens*, which is quite absent in *aurofasciata*; the olive brown ground colour not so deep, so that the lines are less obscure; hindwing pale olive fuscous. West China: Ta-tsien-lu, Pu-tsu-fong; several examples in the Tring Museum; also one from Hainan.

grisescens. **G. grisescens** *Oberth.* (49 e). Resembles *florens* in markings, but the olive green tinge becomes grey and silvery; the outer pale band is curved from costa to inner margin; thorax blackish; underside dark fuscous to subterminal line. Recorded from Ta-tsien-lu, W. China.

argentisparsa. **G. argentisparsa** *Hmps.* Forewing grey dusted with black; a black-edged white spot at base below median vein; a white antemedian band edged by irregularly waved black lines; a waved outer line followed by a diffuse white band which forks to apex; orbicular stigma small, white, with black margins; reniform large and round, with a black edged white band running from it to inner margin, internally dentate; a few scattered submarginal white specks; an irregular patch at anal angle; a marginal series of white lunules; hindwing fuscous, with traces towards inner margin of outer and subterminal lines. Found in Yatong, Tibet.

6. Genus: **Palimpsestis** *Hbn.*

Tongue present; frons smooth; antennae thick, lamellate; palpi obliquely porrect, the second segment hairy, third short; abdomen smooth; eyes glabrous; forewing with vein 5 from middle of discocellular; vein 6 stalked with 7, 8; 9, 10 stalked; 8 and 9 anastomosing to form the areole; in hindwing vein 5 from above lower end of discocellular. Larva living concealed between united leaves; head large, rounded; body smooth, flabby. Type P. *ocularis L.*

fluctuosa.

P. fluctuosa *Hbn.* (49 h). Forewing pale brownish tinged grey; a broad dark fuscous central band including the median and outer lines, limited on both sides by a white conversely black-edged line; subterminal line whitish, waved, preceded on costa by an oblique dark streak; hindwing grey, with paler outer line. Larva yellowish white; dorsal, subdorsal, and lateral lines fuscous; head reddish ochreous with some brown spots; feeding between united leaves of birch. A local species, rare in Britain; found in Scandinavia, and N. Russia; also in South and South East Russia.

duplaris. *argentea.* *obscura.* *pulverosa.*

P. duplaris *L.* (= bipuncta *Bkh.*, bicolor *Esp.*, undosa *Hbn.*) (49 h). Differs from *fluctuosa* in the band being less conspicuous, paler at centre, and with darker lines towards the edges; the white limiting lines less prominent; instead of the dark streak before subterminal line at costa a dark oblique streak from apex; on the discocellular are placed two black spots one at each end. Larva dull dirty grey, darker, more fuscous, on dorsum; dorsal line dark; subdorsal broad, olive green; lateral line finely yellowish; the dots black; head red brown; feeding between united leaves of alder and birch. Occurs throughout North and Central Europe, in N. Italy, Russia, and the Altai Mts., W. Siberia. In the ab. **argentea** *Tutt* the ground colour is silvery white, the lines very distinct; N. England, and Ireland; in ab. **obscura** *Tutt*, from Scotland, the forewing is unicolorous leaden grey with the base and the subterminal line faintly paler; like the latter, but powdery grey without any brown admixture, is a form from the Swiss Alps and the Pyrenees, ab. **pulverosa** *ab. nov.* (56 a), the basal area and subterminal line alone showing pale from the dull grey ground colour.

or. *scotica.* *terrosa.* *flavistigmata.* *albingensis.* *unimaculata.* *discolor.*

P. or *F.* (= flavicornis *Auriv.*) 49 f). Forewing pale to dark grey, tinged with fuscous; lines blackish; the subbasal double; the inner and outer bigeminate, diverging towards costa, sometimes obscured and almost hidden by the dark suffusion; orbicular stigma small, pale, often obsolete; reniform 8-shaped, pale; subterminal line interrupted, formed of whitish, black-edged spots; an oblique black dash from apex; hindwing grey; the ab. **scotica** *Tutt*, from Scotland and other northern localities, has the ground colour pale silvery grey; — **terrosa** *Graes.* from Amurland and Central Asia) (49 h) presents a uniformly dull brown appearance, with all the markings inconspicuous and the stigmata obsolete; **flavistigmata** *Tutt* from Scotland has the stigmata filled in with yellow; in the ab. **albingensis** *Warn.* (49 f) the ground colour is blackish grey and the two stigmata conspicuously white; in **unimaculata** *Auriv.* the orbicular stigma, often small and subobsolete, is entirely wanting; yet another aberration — **discolor** *ab. nov.* (56 a) has both wings dull brown grey, with the markings blurred, the stigmata usually plain; 1 ♀, 3 ♂♂ of this form stood in the Felder Collection among the European examples, but without exact locality. Larva greenish white, with dark dorsal and yellow spiracular lines; head reddish ochreous; feeding between united leaves of poplar. Found in North and Central Europe, S. W. France, N. Italy, S. E. Russia, and Armenia.

ocularis. *amurensis.*

P. ocularis *L.* (= octogesima *Hbn.*, octogena *Esp.* (49 g). Forewing pale grey, with a rosy brown tinge when fresh; subbasal line double, grey; inner and outer lines double, the inner arm of each black, the outer fuscous, towards costa parallel; a fine dark line before the inner and beyond the outer line; the former marked with a blackish spot; stigmata white, the orbicular annular, the reniform 8-shaped; subterminal line pale; an oblique black apical dash; hindwing grey, with pale outer fascia; — *subsp.* **amurensis** *B. Haas* (56 a) is smooth whitish grey, banded with darker grey; the lines limiting median area black and double, sometimes filled in with black; the hindwing with pale outer curved band; the forewing shows no trace of rosy or brown coloration. Larva waxy white; the spiracles reddish; head yellowish with black spots; feeding between united leaves of aspen. Pupa in an open network cocoon among leaves. The imago is very shy, but may be taken at sugar on the aspen trunks. Occurs throughout North and Central Europe, in Spain, France, Italy, Corsica, Sardinia, Asia Minor, Armenia, Fergana, Dauria, N. E. Siberia, Amurland, Corea.

tancrei.

P. tancrei *Graes.* (49 g). Forewing ash grey; inner and outer lines black, concise; the inner nearer base on costa than in *ocularis L.*, the outer nearer the termen; the median space is thus broader than in *ocularis*; before inner line a dark grey band inwardly limited by a blackish line, and traversed by another line less conspicuous; beyond it a pale darker-edged line; a similar line before outer line, rising from a whitish costal patch; reniform stigma whitish grey, with fine black outline; orbicular obsolete; a faint grey median shade; subterminal line pale, obscure, wavy; at anal angle a large roundish whitish grey patch; the space between outer and subterminal lines darker; hindwing pale grey, with a pale curved outer line. Amurland.

ornata. *unicolor.*

P. ornata *Leech* (♂ 56 b, ♀ 49 g). Forewing greyish brown, especially at base and along costa; inner band of central fascia formed by 4 dark wavy lines; its inner border curved and crenulate; the outer elbowed at subcostal vein and indented above inner margin; the central fascia above inner margin greyish white; outer line lunulate dentate, double, and angled outwards in middle, followed by a pale band limited externally by a lunulate dentate line; subterminal line pale, dentate, curving from apex to anal angle; terminal lunules black; tufts of raised black scales at base and on orbicular stigma; the reniform edged with white; hindwing fuscous, darker terminally; the ab. **unicolor** *Leech* is darker and without any trace of central fascia, the only visible markings being the basal dash and submarginal band. Japan.

renalis. **P. renalis** *Moore.* Forewing pale lilac grey speckled with darker and tinged in places with pale brownish; the basal and median areas towards costa whiter; an oblique black dash near base across submedian fold; inner line black, shallowly lunulate dentate, straight and oblique from $^{1}/_{5}$ of costa to near middle of inner margin, preceded by two or three lines filled up with yellow grey and then with brown forming a band; the basal area limited by a dentate dark line angled outwards on median vein; outer line double, fine, dentate-lunulate, the teeth pointing basewards, angled outwards on vein 4, the inner arm closely approaching the inner line at inner margin, closely preceded by a parallel median line; stigmata filled up with greyish yellow, the orbicular oblong, the reniform dumb-bell-shaped, projecting below median vein; subterminal pale, dentate, obscurely defined, except by two or three dentate black marks beyond it at middle; an oblique black streak from apex; a series of conspicuous black spots between veins just before termen; fringe pale grey; hindwing fuscous, the fringe pale grey. Described from the Kangra Valley, Punjab.

orbicularis. **P. orbicularis** *Moore.* Forewing dull cinereous speckled with blackish, most thickly in terminal area; a blackish spot at base on submedian fold; inner line black, before $^{1}/_{3}$, evenly outcurved, and insinuate on vein 1; preceded by two indistinct dark parallel lines; the basal area limited by a thicker curved wavy line; outer line black, concave outwards from costa to vein 4, on which it is bent, then oblique inwards to submedian fold, and vertically sinuous to inner margin, followed immediately by a dark parallel line, and at a distance by a dark wavy line; subterminal line pale grey between blackish shades, met by a curved blackish streak from apex; a black terminal festoon; fringe dark grey with thick middle line and bright pale basal line; stigmata pale with black outlines; the orbicular large, rounded; the reniform narrow, inwardly oblique, with dark linear centre; the orbicular is filled up with dull yellowish white, showing glossy in certain lights; hindwing fuscous. The Kangra Valley, Punjab.

albidisca. **P. albidisca** *Warr.* (= albidisca *Moore*). Forewing greyish white with a greenish tinge; an oblique white spot at base containing a black spot and followed by a black oblique shade; inner line black, sinuous, excurved below costa and insinuate on submedian fold, preceded by a dark grey band traversed by three black lines; three outer lines more obscure, but bluntly angled on vein 4; median fascia often white below middle; orbicular and reniform stigmata linear, black, with a few pale scales; orbicular touching inner line, reniform across the angle of outer line; subterminal line grey, sometimes white, waved between dark shades; an oblique dark streak from apex, and a reddish brown cloud beyond reniform stigma; a dentate wavy median line; hindwing dull grey. Both types from the Punjab; Berham Gully and the Kangra Valley respectively.

brevis. **P. brevis** *Leech.* Forewing grey brown with a cupreous tinge; some silvery white spots at the base, and some whitish marks towards apex dotted with black; stigmata with black outlines, lying in an obscure dusky band, which is contracted below middle; traces of several black transverse lines, which are plain only towards costa; veins dotted with white; hindwing fuscous grey, darker terminally. Described from a single ♂ from Ta-tsien-lu, W. China.

undosa. **P. undosa** *Wilem.* (56 a). Forewing greyish white suffused with brownish except on the costal area; a black subbasal line; inner band greyish brown, broad, traversed by a double curved black line, preceded by a black wavy line indistinct towards costa, and followed by a double sinuous black line; outer line black, crenulate, slightly curved; subterminal line pale, with a brownish spot on costa, and a short blackish dash from it into apex; a linear black mark on discocellular; fringe grey tinged at base with brown; hindwing pale fuscous; the fringe paler. Described from a single ♀ from Hondo, Japan.

basalis. **P. basalis** *Wilem.* Forewing whitish grey, tinged with fuscous on outer third; basal area brownish, towards costa darker, limited by a black obtusely angled line; some long black scales on median vein; stigmata represented by tufts of white scales, the reniform with some black scales also at lower end; outer line black, wavy, excurved to vein 2, then straight to inner margin, plainest at costa, and followed by a wavy pale-edged dusky line; subterminal line whitish, waved; fringe grey with darker tips; hindwing pale grey suffused with fuscous, with an indistinct double blackish median line. Described from a single ♀ from Nikko, Japan.

ampliata. **P. ampliata** *Btlr.* (49 g). Forewing whitish grey dusted finely with darker: the basal and median areas and a triangular space at apex usually of this pale ground colour; subbasal line angled, black; 4 black crinkled vertical lines filled in with brownish form an inner dark band; outer line double, lunulate dentate, the teeth pointing basewards, more strongly indented on each fold, the outer arm followed by a shade line and at a distance by a blackish line parallel; these lines also usually, either in whole or in part, filled up with darker; submarginal line pale, wavy-dentate, followed by a dark, sometimes well marked shade; a black streak oblique from apex, and curved below 6; reniform stigma oblong, subquadrate, whitish grey with black outline and a fine central line always thickened at lower end; orbicular touching reniform, a small white dot in a black ring; a black somewhat lunulate terminal line; fringe pale grey, rayed with black; hindwing fuscous grey with outer line and a broad terminal border darker; in W. China and the Ussuri district a dark form occurs — subsp. **suffusa** *subsp. nov.* (56 a) in which the whole forewing is clouded with dark grey; the type form is from Japan only; specimens from Corea and Amurland appear in a way intermediate, being generally darker, but with a quite narrow paler median fascia, = subsp. **angustimedia** *subsp. nov.* (56 b); these are smaller than typical *ampliata*.

suffusa.

angustimedia.

P. intensa *Butl.* (= octogesima *Butl.* nec *Hbn.*, angustata *Stgr.*) (56 b). Smaller than *ampliata Btlr.* but similarly marked, except that the outer of the four lines forming the inner band is obliquely curved outwards from costa instead of starting vertically; the two outer of the 4 lines running more wavy and oblique throughout; also the orbicular stigma is larger, black-centred, and does not touch the reniform, which in its lower lobe is marked with a round black spot; Butler's type from Japan; Staudinger's *angustata* from Amurland.

intensa.

7. Genus: **Paragnorima** *gen. nov.*

Differs from all the allied genera of the Family in the antennae of the ♂ being subserrate, with short sessile fascicles of cilia, not smooth and lamellate; in the shorter hairy palpi, with small, almost hidden, terminal segment, and especially in the presence of an areole in the forewing, vein 9 anastomosing with the stalk of 7, 8; vein 6 rises from angle of cell and is not stalked with 7, 8. Type *P. fuscescens Hmps.* from India.

P. brunnea *Leech.* Forewing light fuscous brown, the basal area greyer; subbasal line broadly black, emitting a projection outwards below the median vein; four other lines black and waved; the first curved, the second nearly straight, the intervening space brown; third line double, fourth excurved towards middle, the intervening space likewise brown, subterminal line dusky, waved, followed on costa by a triangular brownish grey patch, edged externally with black; stigmata indistinct, the reniform with its inner edge black; hindwing fuscous. Described from a single ♀ taken at Pu-tsu-fong, W. China. The species so closely resembles *fuscescens Hmps.* that it may safely be referred to *Paragnorima*.

brunnea.

8. Genus: **Parapsestis** *gen. nov.*

Differs from *Palimpsestis Hbn.* in vein 6 of forewing rising from upper end of cell instead of being stalked with 7, 8; antennae in both sexes lamellate; except for this it agrees entirely with *Paragnorima Warr.* Type *P. argenteopicta Oberth.*

P. argenteopicta *Oberth.* (49 g). Forewing pale shining grey more or less dusted with darker and traversed by wavy dark lines; three white spots at base of wing, often obscured, surrounded by dark scaling; three dark lines, the outermost angled outwards in submedian fold, and filled in with dark grey, form the inner band, which is preceded by a pale dark-edged line; outer band formed of 3 or 4 obscurely marked lunulate dentate lines, outcurved between vein 6 and the submedian fold, filled in with dark only at costa; the teeth of these lines form dark dashes on veins alternating with pale ones; subterminal line white interrupted into spots, preceded by blackish wedge shaped marks and followed by a dark shade; an obscure dark streak from apex; terminal line thick, lunulate; fringe grey mottled with darker; stigmata rarely plain, grey with darker outlines; the orbicular round, the reniform oblong; hindwing dingy grey, with a paler outer band and narrow terminal space beyond the subterminal line; in the ab. **plumbea** *Butl.* (56 b) the forewing is suffused with dark leaden grey, obscuring the markings generally, but the 3 white spots at base, those forming the subterminal line, and the white dots on the veins stand out conspicuous. The paler forms are typical, from Amurland; Japanese examples are generally darker, culminating in the suffused aberration *plumbea*.

argenteopicta.

plumbea.

9. Genus: **Polyploca** *Hbn.*

Differs from *Palimpsestis Hbn.* in the eyes being hairy; the third segment of dorsum with a crest. Larva living concealed between united leaves of trees. Type *P. flavicornis L.*

P. diluta *F.* (= bipuncta *Dup.*) (49 h). Forewing whitish grey or lilac grey or dark grey; a short black dash on submedian fold near base; the base itself diffusely darker; inner band brown, formed of three lines, the inner two dark grey and diffuse, the outer concise and black, outwardly elbowed on each fold, inwardly angled on vein 1; outer line double, inwardly dentate, incurved from costa to vein 4, then vertical and undulated, followed by a diffuse brown shade edged with a dentate brown line, followed again after a pale space by another dark dentate line; subterminal pale followed by a darker shade and met by a black oblique mark from apex; a line of black marginal lunules; reniform stigma narrow, grey with a black edge, bearing a small white spot at its lower end; hindwing pale grey with darker outer band marked by dark streaks on the veins, and a broad

diluta.

latimedia. *nubilata.* darker terminal border; in the darker grey examples the narrow pale median area becomes as dark as the bands, which are not filled in with brown, forming a broad dark median fascia edged by pale lines, = ab. **latimedia** *ab. nov.* (56 b); these grey forms are all from Herculesbad, Hungary; in the ab. **nubilata** *Tutt* from the North of England the usual bands and the base are dark chocolate brown. Occurs in South and Central Europe, in Belgium, Denmark, Britain, N. Germany, Italy; and in Pontus, Asia Minor. Larva pale yellowish, greyer at the sides; dorsal line grey; spiracular pale yellow: tubercles black; head fuscous; feeding between united leaves of oak.

flavicornis. *galbanus.* *scotica.* *finmarchica.* **P. flavicornis** *L.* (= cinerea *Auriv.*) (49 h). Forewing greenish grey densely black scaled; costa in median area broadly pale; the subbasal and double inner lines obliquely curved outwards, indented on submedian fold, the subbasal followed by a pale space, the two inner blacker with a grey line between them; outer line black, indented on each fold, and elbowed outwards at vein 4, followed closely by a light and at a distance by a dark grey dentate line; subterminal line pale grey followed by a blackish waved line and meeting a black oblique streak from apex; orbicular stigma large and roundish, whitish or greenish white, or yellowish white, sometimes coalescing with the smaller whitish reniform; hindwing dull grey with a brownish fuscous terminal border and pure white fringe; a darker outer line is sometimes marked; ab. **galbanus** *Tutt* (56 c), from the South of England, has the ground colour pale green, with the markings not so prominent, the stigmata whitish; in ab. **scotica** *Tutt*, from Scotland and ? E. Siberia, (56 c) the ground colour is dark grey with the costa at middle and the stigmata pale; in **finmarchica** *Schöyen* (56 c) from Lapland and Norway, the whole wing is blackish and the hindwing dark grey. North and Central Europe, N. Italy, S. E. Russia. Larva greenish grey below, darker, more grey brown, above; subdorsal and spiracular series of black spots; tubercles white; head reddish brown; in rolled leaves of birch when young, afterwards between united leaves.

ridens. *xanthoceros.* *interrupta.* *concinna.* **P. ridens** *F.* (= erythrocephala *Esp.*) (49 i ♂, 56 c ♀). Forewing very dark fuscous green on a whitish ground; the inner, outer, and subterminal lines greenish white; the inner excurved above and below median and preceded on costa by an irregular white patch; outer line less distinct; the subterminal strongly dentate; the stigmata whitish, often suffused and hidden; a grey median line sometimes evident; a deep lunulate terminal line, the lunules filled with greenish white; fringe grey with greenish white tips, rayed throughout with black; hindwing whitish clouded with grey; a broad greyish brown terminal border beyond a curved whitish outer band; the veins dark; in the form **xanthoceros** *Hbn.* (56 c) the extreme black scaling is absent and the white lines are replaced by brownish grey; this latter is the usual form in Britain; in **interrupta** *Tutt* (56 c) the ground colour is paler grey throughout, and the central fascia is interrupted by a grey space across wing; in the ab. **concinna** *ab. nov.* (56 c) the basal area and the whole space beyond median fascia to termen is pale bluish green; the extreme base with some olive and fuscous scales; the median area olive fuscous, with the two lines and the veins black, the stigmata marked with pale green scales; the subterminal line sagittate, interrupted on vein 5; the terminal line lunulate, and the fringe white intersected by black wedge shaped marks beyond veins: hindwing white with termen narrowly grey; the example, a ♀, is of English origin, being low set, and evidently bred, but without exact locality. Occurs throughout Central Europe, in Britain, Northern France, Spain, Denmark, and Livonia. Larva yellow; dorsal and spiracular lines green; subdorsal green, but usually interrupted; lateral and subspiracular series of small black spots; tubercles white; head orange ochreous; between spun together leaves of oak.

ruficollis. **P. ruficollis** *F.* (49 i). Forewing dull greenish cinereous; inner band consisting of two diffuse dark grey shades, preceded by an obliquely curved grey line and followed by a fine black line, this last vertical and slightly outbent below costa; outer line double, filled in with dark grey, excurved from vein 6 to 2, then vertical; subterminal line very faint, slightly darker, meeting a fine oblique apical streak; terminal line black; fringe concolorous; reniform stigma of the ground colour with black outline, touching outer line; hindwing dull pale grey, with paler fringe and a rather large discal spot. The ♂, which is rather larger than the ♀, has the pale bands before and after the median fascia tinged with rufous brown, the vertex of head and the tegulae also brown; the antennae of the ♂ have short clavate pectinations. Restricted to the South of Europe, France, Switzerland, Italy, Greece, Carniola, Austria and Hungary.

arctipennis. **P. arctipennis** *Butl.* (49 i). Forewing pale grey, dusted and banded with darker; basal area darker grey, with a black spot at base of submedian fold; inner band formed of two black lines elbowed outwards on each fold, preceded by a diffuse dark grey band separated from basal patch by a pale line; outer line double, the inner arm blacker, angled outwards on vein 4, and again less strongly at vein 1; a double dark grey line forming a kind of band before the pale subterminal, which is externally bounded by a row of black lunules, met by an oblique black streak from apex; spots along termen black; fringe grey; a distinct angled median line; a black spot at lower end of discocellular marks the reniform stigma; sometimes a black dot indicates the orbicular; hindwing whitish, with broad dark grey terminal border and traces of two outer lines; fringe white; an unmarked form occurs — ab. **innotata** *ab. nov.* (56d), in which the forewings are dull uniform cinereous, without *innotata.* black markings, the inner, outer, and subterminal lines being pale grey. Japan. When fresh the third dorsal segment bears a strong black crest.

P. punctigera *Butl.* (56d). Forewing dull cinereous with faint markings; inner line diffuse, dark grey, *punctigera.* oblique, preceded by a pale shade; outer line obscure, double, angled outwards on vein 4, indicated only by dark dashes on veins; subterminal very indistinct, pale edged outwardly with dark; a slight dark streak from apex; orbicular stigma a round white spot in a black ring; reniform a small whitish lunule; hindwing rather paler, with a dark outer line and broadish terminal border. Japan.

P. nigrofascicula *Graes.* Forewing dark cinereous, traversed by numerous obscure pale grey and dark *nigrofascicula.* fuscous lines; basal area rather paler; the inner band of central fascia containing 5 blackish lines; a similar but less distinct outer band; subterminal plainer, formed of small pale spots; reniform stigma a black point; orbicular obsolete; an oblique black dash from apex; hindwing yellowish grey, darker terminally; dorsum with a black crest on third segment. Amurland. Described from 2 ♀♀ bred from overwintered pupae.

10. Genus: **Nemacerota** *Hamps.*

Tongue present; frons smooth; palpi porrect, the second segment well scaled, the third short and smooth, slightly deflexed; antennae of ♂ pubescent, slender, of ♀ simple, filiform; face and vertex hairy; thorax stiffly haired; abdomen smooth, without crests; pectus, femora, and tibiae woolly; forewing narrow and elongate, the costa faintly curved throughout; apex blunt; termen curved; hindwing broadly triangular, truncate at anal angle; forewing with cell half as long as wing; discocellular vertical, externally biconcave; vein 5 from the tooth a little below middle; 6 short-stalked with 7, 8, which are on a long stem; 9, 10 stalked; 11 free; hindwing with the discocellular vertical in upper half, then very oblique and fine, scarcely distinguishable; vein 5 from the angle. Type *N. cinerea Warr.*

N. umbrosa *Wilem.* Forewing dark fuscous grey in basal and terminal areas, pale brownish dusted with *umbrosa.* darker in the median; a blackish dot on discocellular, followed by a transverse fuscous shade; inner line diffuse; outer line marked with whitish at costa; subterminal line pale, rising from a whitish apical mark; hindwing fuscous, with an indistinct paler median band. Yesso, Japan.

11. Genus: **Axia** *Hbn.*

Tongue well developed; frons smooth; palpi porrect, short, the second segment hairy below; antennae of ♂ bipectinate to apex, of ♀ serrate; thorax and pectus woolly; abdomen smoothly scaled; forewing triangular, rosy pink or purple, adorned with gold and silver patches and lines; cell broad; the discocellular oblique; median vein strongly upturned at extremity, vein 3 appearing as its continuation, and vein 4 to rise above it; 5 from or from above middle of discocellular; veins 7, 8 and 9, 10 stalked, 8 anastomosing with 9 to form an areole; hindwing with costal curved and closely approximated to subcostal throughout, vein 7 from just before end of cell, curved upwards shortly towards costal, vein 6 straight and obliquely depressed; 5 from centre of discocellular. Type *A. margarita Hbn.*

A. margarita *Hbn.* Forewing pink; a silvery white streak from base along median vein and another *margarita.* along inner margin, the basal area between dull yellow; beyond cell a large triangular silvery blotch, with a silvery dot obliquely beyond it, a brown oblique streak from costa joining outer line, which towards inner margin has a silvery edging; terminal area dull yellow; fringe pink; hindwing and fringe yellowish white, the termen slightly grey-dusted. Found sparingly in Spain, S. France, Italy, Istria, and Carniola. Still apparently a rare insect.

A. olgae *Stgr.* Of the same size and coloration as *margarita Hbn.* Forewing rose red with *olgae.* broad golden terminal band, a long oval golden yellow basal patch, and a smaller one of the same colour at the end of cell; the basal patch lies between the median vein and vein 1 and reaches beyond ${}^1/_3$ of inner margin; the golden terminal border at its lower end is obliquely swollen to below the end of the cell, where it is separated from the small golden patch at end of cell only by the uncoloured median vein; in *margarita* this smaller patch is silvery, and is followed by a short silvery stria; hindwing dirty white with the fringe rosy. Borjom, Transcaucasia.

A. vaulogeri *Stgr.* (56h). Considerably larger than *margarita Hbn.* Forewing violet red, becoming *vaulogeri.* strongly darker beyond middle; at base of submedian interval a small triangular brown patch finely edged with silvery; the yellowish streak at base of costa obsolete; beneath the silvery oval patch at end of cell a faint serpentine dark transverse line; the golden terminal border almost obsolete, but instead the silvery streak before it is much larger, swollen into a blotch below, and only narrowly edged with bronzy; a black terminal line before the violet red fringe. Algeria.

12. Genus: **Epicimelia** *Korb.*

Tongue well developed; frons smooth; palpi short, the second segment rough haired, the third short and stumpy; antennae bipectinated in both sexes, shorter in ♀ than ♂; thorax roughly haired; abdomen smooth; forewing broadly triangular with a large pale stigma; veins 9, 10 only stalked, 7 and 8 from end of cell, 6 slightly below; but veins 8 and 9 do not anastomose, and there is no areole; the cell in both wings very broad, and the median vein still more abruptly upturned at extremity, in the hindwing nearly at right angles. Type *E. theresiae Korb.*

theresiae. **E. theresiae** *Korb* (56 e). ♂ Forewing dull pink, a pale dull brassy yellow blotch at base, not reaching above median vein, its oblique outer edge diffuse and ending near middle of inner margin; a thick diffuse dark shade oblique from apex to $^3/_4$ of inner margin, interrupted in middle; at end of and beyond the cell a large leaf-shaped creamcoloured blotch tinged with yellow, the stalk resting on the discocellular, the blade extending towards termen along veins 3 and 4, at each of which it is bluntly toothed; the whole of the central triangle between basal patch and outer line deeper red; fringe deep pink beyond a fine greenish terminal line; hindwing pale yellow, broadly tinged with orange red along inner margin, and with a slight brownish cloud at end of vein 2; fringe deep pink beyond a dull green terminal line; the ♀ has the forewing deeper coloured, with the costal edge bright pink; the hindwing wholly orange fulvous. Anatolia. The larva is reasonably suspected of feeding on an Astragalus.

13. Genus: **Diloba** *Bdv.*

This Genus which repeatedly has been thrown about between Bombycidae and Noctuidae, does not with certainty belong here. After having for some time been referred to the *Acronictinae* and placed close to *Bryophila* by Staudinger and Rebel, we do not find it among the *Acronictinae* in Hampson's new catalogue which among all systems established so far most thoroughly considers the anatomical structure; very likely it will be put back into the heterogeneous group of *Bombyces.* Its whole Habitus is bombycoid, the body heavy, head large, frons heavily clothed with thick hair and adorned in middle by a crest of hair; palpi strong and porrect, antennae of ♂ very long and strongly bipectinate, provided at base with two tufts of hair as in Notodontidae; thorax long, smoothly haired; abdomen of ♀ very thick and heavy. Only one species known, restricted to Europe where it is very common.

caeruleocephala. **D. caeruleocephala** *L.* (49 l), the common 'Blue Head', resembles a species of *Drymoea* of the family of Notodontidae. Forewing brownish-violet, mottled with grey. Orbicular and reniform stigmata unite to form a greenish-white design resembling the figure 88 and joining a costal spot of pale grey. Hindwing grey, paler in ♀, marked near the base with a dark dash such as we find in the majority of Notodontidae. — ab. *separata.* **separata** *Schultz* which occurs together with the first described form, though rather scarce, has the stigmata *armena.* in the forewing separate, the form **armena** *Stgr.* from Asia Minor the forewings uniform grey. — Egg semi-globular. Larva pale whitish-green, very thick, with bluish-green head, covered throughout with dark, minute tubercles which are provided with single, long bristles. It is found from early spring until June on various deciduous trees, preferably on black-thorn and fruit trees. Pupa irrorated with blue, pupal state lasts about three months, the imago emerging in fall. The latter flies at night time, and is very common throughout Europe with the exception of the Polar Region, but only locally and in certain years. The reports that in some regions it has increased to such an extent as to cause considerable damage are certainly greatly exaggerated.

Alphabetical List

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* signifies that the form is figured at the place quoted.

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xanthoceros Pol. *Hbn.* Smlg. Eur. Schmett. Noct. *

19. Family: Megalopygidae.

This curious family, which ranges over a great part of the Globe, is throughout represented by very pale forms, which are heavily clothed with hair and approach in facies partly the *Limacodidae*, partly the *Lasiocampidae*. Most highly characteristic of this family is the presence in the larva of 14 instead of 10 prolegs, the 9th and 10th somites also being provided with abdominal suckers.

These peculiar larvae are capable of withdrawing the head completely within the first segments; they live free upon the food-plant, and some species are provided with extremely poisonous hair. To this family belongs e. g. the South American larva called "Susuranna", whose yellow hair, if brought in contact with the human skin, certainly produces the most violent irritation I ever observed. In Brazil I had occasion to treat a woman who while picking fruit had accidentally touched a caterpillar of *Megalopyge orsilochus Cr.* On my arrival the inflammation had already spread from the hand to the arm and seized the upper half of the body, and it took a fortnight for the high fever to go down and to enable her to leave the bed; moreover, I was told by the Indians — who, however, are greatly given to exaggeration — that if such an inflammation affected the mucous membranes of the head of children, not infrequently death resulted.

In this extraordinarily violent action of the poisonous hair the *Megalopygidae* are rivalled by the *Limacodidae*, some species of which, as e. g. *Neaera* (*Parasa*) *consocia* from China or *Sibine nesea* from South America are provided with stinging organs, and occasionally derive their names from those properties, viz., the Australian *Doratifera vulnerans Lew.*

Also the metamorphosis of the *Megalopygidae* is most peculiar, and strongly recalls the *Limacodidae*. After having spun their very regular, egg-shaped cocoon, in which the species provided with long wavy hair very artfully make use of these locks, giving the cocoon the appearance of a curly wig, there commences a sort of ante-pupal state; and in like manner as the larvae of our northern species of *Limacodes* pass the winter in a shrivelled, dormant condition and only form the pupa proper about 4 weeks before the development of the imago, the North African genus *Somabrachys* passes the hot and arid summer peculiar to the southern part of the Palearctic Region in the same state, changing into the real pupa only when towards the end of summer the first rains approach.

Another peculiarity is noticed in the manner in which the imago opens its artful prison. The North American species *Lagoa pyxidifera*, "the boxmaker", opens its house so regularly and according to all the rules of art, that the lid remains attached to a sort of hinge as in a beer-mug, and may be closed again at will, in which case the cocoon appears quite intact. The same phenomenon was observed by Powell in the Palaearctic *Megalopygidae*, in which peculiarity they again resemble the *Limacodidae*. The other characteristics of the only specifically Palearctic genus occurring within our region are given below. Here I only wish to mention a curious organ first discovered by Jordan in the larvae of *Somabrachys*, consisting of a rake-shaped appendage attached to the anal extremity of the larva and provided with 4 teeth, which being ordinarily hidden under the anal segment is used during the process of evacuation for removing the excrements.

1. Genus: **Somabrachys** *Kirby.*

Comprising a number of rather small-sized, unicolorous forms; but the number of species is difficult to determine. The ♂♂, while externally resembling those of *Chondrostega*, are of weaker build, having occasionally the abdomen atrophied. Antennae pectinate, frons covered with woolly hair, eyes hidden, the woolly thorax heavier, legs delicate, abdomen very small. The forewing has the costa elongate, somewhat concave as in *Chondrostega*, apex produced but rounded, occasionally lobe-shaped, the inner margin straight; the terminal border presenting such a regular curve that the inner angle is represented by a perfectly regular arc. The course of the subcostal diverges from the costal, rendering the cell very elongate, wedge-shaped; the upper and middle discocellular run at a right angle to one another, the middle and lower ones at an obtuse angle; the upper radial is strongly curved. Hindwing oval, feebly angled at apex, terminal border uniformly rounded. Eggs elongate egg-shaped, flattened at the poles; they are deposited in layers on twigs or blades of grass in such a manner that they are arranged in longitudinal rows, the poles touching, the micropyle slightly elevated. Often one finds a dozen or more of such rows side by side or on top of one another, thinning out in front and behind. Larvae feed on herbaceous plants; they are not unlike those of Zygaenidae, from which they may be easily told by the greater number of prolegs; they are thick, puffed-up, soft-skinned, provided with isolated, short, soft hairs which produce an irritation upon the skin of sensitive persons. (Whereas I never personally suffered such bad effects, Powell reports being always subject to them). In June they reach their full size, after which they weave an egg-shaped cocoon, in which they lie dormant for weeks, like the *Limacodidae*, in a shrivelled and almost immovable condition; they enter the pupal state about 4 weeks before the emergence of the imago, which takes place in fall. The pupa has the extremities enclosed within separate sheaths, as in the *Limacodidae* (Pupa libera), and the skin is very delicate, for which reason they invariably die if taken out of the cocoon. The ♂♂ flie in stubble-fields, chasing after the wingless ♀♀ which in general resemble those of *Orgyia antiqua*, but are more agile and able to run rather fast. The imago emerges mostly towards evening, and as the ♂♂ commence flying very soon afterwards it is necessary to kill them as quickly as possible if one wishes to preserve the very delicate wings. The ♂♂ come to the lamp; the different species look very much alike and can often only be told apart by rearing the larva; nearly all are a uniform mouse-grey or earthy-brown and in certain localities very common. The larva is during day-time concealed on the underside of the blossoms of Compositae or Umbelliferae. Of the caterpillars which are gathered in a grown-up state, a high percentage is infested by Tachinae. All the hitherto known species are found exclusively in North Africa. There are about 20 forms known, all more or less looking alike. Presumably not all of these represent distinct species, but in a number of cases the knowledge of the earlier stages has put their specific difference beyond doubt.

aegrota. **S. aegrota** *Klug* (50 d), distinguished from the allied species by the colouring being more grey than earthy brown. Larva unknown. — Described from the neighbourhood of Alexandria in Egypt. Type in Berlin.

klugi. **S. klugi** *Oberth.* (50 d), in colour, size and shape of wings resembling *aegrota Klug* from Egypt, from which, according to Oberthür's figure it differs in its more slender and slim facies. The ♀ has the hair not yellowish brown as the other species of *Somabrachys*, but silvery grey. — From Western Algeria.

codeti. *albinervis.* *atrinervis.* **S. codeti** *Aust.* (50 d), almost as robust as the preceding species, but of smaller size and of a faint brownish yellow tinge. From Sebdou, Prov. of Oran, Algeria. — ab. **albinervis** *Oberth* (50 d) differs from the monotonously coloured *codeti*, in which the veins stand out very dark, principally in being faintly suffused with grey, which leaves the veins quite pale, especially the subcostals and radials in the forewing of the ♂; likewise from Sebdou. — Another form having the veins black and very distinct (= **atrinervis** *Oberth.*), from Géryville, Prov. of Oran, may also be mentioned here. — Larva pale greenish-yellow, adorned on the back by a broad, dark purplish brown, sometimes violet-grey band which is divided by the paler dorsal line and edged with yellow. Every segment is on the side marked by a large, chocolate-coloured spot surrounding the spiracles, which are delicately ringed with yellow. Abdomen ventrally pale yellow. At the end of May it is full-grown, being found on Helianthemum, Ephedra, Erodium, Bupleurum and other plants, often burrowing into the thalamus of the blossoms. Pupa dirty yellow, dorsally with two fine grey lines. The imago belongs to the larger species of the genus, and is by some authors united with *aegrota*, which, however, differs in having the ground-colour more grey.

arcanaria. *capsitana.* **S. arcanaria** *Mill.* In size like *codeti* which it also closely resembles in other respects. Body very robust, colouring dull grey-fuscous, with veins more or less dark. Eastern Algeria, Bône and the adjacent parts of Tunisia. — **capsitana** *Chrét.* (50 d), from Southern Tunisia, our figure representing the cotype from Gafsa contained in the Puengeler collection, appears closely allied to the preceding form, from which it may be distinguished by the thinner scaling, which renders the veins more prominent.

massiva. **S. massiva** *Oberth.* Very much like the preceding species, but remarkable for the much more graceful build of the ♂. — From Tunisia.

infuscata. *maroccana.* **S. infuscata** *Klug*, described from Egypt, by Oberthür declared identical with a rather more slender form from Morocco which he names **maroccana** and characterizes as being more brown and more distinctly veined than the other forms of *Somabrachys*. Whether these two forms should be united can only be decided after we have more abundant material at our disposal.

adherbal. **S. adherbal** *Oberth.* is the smallest and most slender form of the entire genus so far known, having the wings very thinly scaled, translucent and of pale colour, the antennae deeper yellow. Larva with a dark grey dorsal band, which has a pale yellow outline and bears a number of pale yellow tubercles; the pale yellow lateral band does not extend above the upper part of the spiracles which are enclosed by deep yellow rings. Cocoon dark brownish-gray, very similar to that of *S. manastabal*; pupa smaller, but coloured like those of the allied species. Imago emerges in August and September. — Geryville.

manastabal. **S. manastabal** *Oberth.* Resembling the preceding species in shape and size, but differing according to Oberthür's figure in the deeper colouring and denser scaling; with certainty probably only to be distinguished in the larval stage, which has the dorsal tubercles less prominent and the dorsal stripe more greenish gray, and lacks the yellow marginal lines, which latter feature is only found in this species; the larger tubercles brillant orange. — Found in the South of the Algerian Province of Oran.

S. chretieni *Oberth.* (50 d). Considerably larger and robuster than the preceding species, more thinly scaled, duller in colour, which is a dirty pale brownish grey; the veins contrast but very little. — In Western Algeria, in the autumn. *chretieni.*

S. mogadorensis *Oberth.* (50 d). Similar to the last, slenderer, the costal margin of the forewing more concave, the thorax slender, but with a dense coat of bright yellowish brown hair. Both wings more yellowish brown than in the preceding form, the hindwing paler, only being darker at the distal margin. — From West Morocco. *mogadorensis.*

S. khenchelae *Oberth.* (50 d). Both wings of the ♂ more elongate, as large as in *aegrota*, but more evenly scaled, only the apical lobe distinctly darker. The entire colouring more dark grey, the veins slightly paler. — Algeria, the largest known species. *khenchelae*

S. kroumira *Oberth.* (50 d). One of the larger species, dirty earth-colour, with rather conspicuous darkening in the costal area of the forewing, often also in the cell. Appears to be exceedingly close to the previous form. — From West Algeria and Tunesia. *kroumira.*

S. fumosa *Oberth.* Under this name OBERTHÜR figures an obviously deep brown specimen which came from Géryville in West Algeria, like *S. codeti atrinervis*. The colouring is dull chocolate-brown. *fumosa.*

S. holli *Oberth.* In colour and size similar to *fumosa*, deep brown, rather robust in build, but considerably smaller. — "Hussein Dey" is given as habitat. *holli.*

S. hiempsal *Oberth.* One of the smallest species, as small as *holli*, but much slenderer in body, with weak thorax and almost atrophied abdomen. The wings are said to be more golden brown and the fringes very long. The colouring is greyish ochreous, the body brown, suffused with yellow. — From Khenchela in Algeria. *hiempsal.*

S. powelli *Oberth.* (50 d). Size and build as in the preceding, wings broad, abdomen vestigial; the wings not greyish brown, but dark grey, and the hair of the body yolk-colour. — From Western Algeria. *powelli.*

S. ragmata *Chrét.* is a form from Tunisia; entirely brown, or brown with a longitudinal yellowish band from the base to the hind angle of the forewing, a basal streak along the median vein, some oval spots before and behind the end of cell, and an elongate apical spot yellowish; costa darker brown, likewise the veins somewhat more obviously dark; subterminal area with a more or less extended yellow suffusion. — From Gafsa; larva found on Erodium. *ragmata.*

Alphabetical List

of the Palearctic *Notodontidae* with references to the original descriptions.

* signifies that the form is figured at the place cited.

aegrota Som. *Klug*, Symb. Phys. pl. 20. *
adherbal Som. *Oberth.* Ét. Lép. Comp. 5, p. 274. *
albinervis Som. *Oberth.* Ét. Lép. Comp. 3, pl. 21. *
arcanaria Som. *Mill.* Rev. Entomol. 3, p. 6. *
atrinervis Som. *Oberth.* Ét. Lép. Comp. 5, p. 255. *

capsitana Som. *Chrét.* Le Natural. 32, p. 78.
chretieni Som. *Oberth.* Ét. Lép. Comp. 4, pl. 36. *
codeti Som. *Aust.* Ét. Lép. Comp. 3, pl. 21. *

fumosa Som. *Oberth.* Ét. Lép. Comp. 5, p. 299. *

hiempsal Som. *Oberth.* Ét. Lép. Comp. 5, p. 297. *
holli Som. *Oberth.* Ét. Lép. Comp. 5, p. 298. *

infuscata Som. *Klug*, Symb. Phys. pl. 20. *

khenchelae Som. *Oberth.* Ét. Lép. Comp. 3, pl. 21. *
klugi Som. *Oberth.* Ét. Lép. Comp. 5, p. 297. *
kroumira Som. *Oberth.* Ét. Lép. Comp. 5, p. 300. *

manastabal Som. *Oberth.* Ét. Lép. Comp. 5, p. 278. *
marrocana Som. *Oberth.* Ét. Lép. Comp. 5, p. 297. *
massiva Som. *Oberth.* Ét. Lép. Comp. 5, p. 299. *
mogadorensis Som. *Oberth.* Ét. Lép. Comp. 3, pl. 21. *

powelli Som. *Oberth.* Ét. Lép. Comp. 3, pl. 21. *

ragmata Som. *Chrét.* Le Natural. 32, p. 78. *

20. Family: Limacodidae.

This family, which contains about 400 species, is one of the most specialised groups of Moths. Structure, life-history and habits prove the family to be decidedly homogeneous. The round shape met with among the larvae, pupae and imagines is not found so generally and so uniformly developed in any other family of Lepidoptera. The larva has nearly always an ovate contour; the cocoon is an almost geometrically correct small egg; the fore- and hindwings of the moth are likewise in most cases ovate with the angles nearly effaced.

As regards anatomical peculiarities a short description will be sufficient, as quite a number of exceedingly conspicuous characteristics render it quite impossible to confuse Limacodids with members of other families. The larva has, above all, the peculiarity that the venter instead of bearing single prolegs is modified into one broad adhesine sole (slug-larva). Whether the caterpillar is smooth or hairy, provided with tubercles or tufts, warts or spines, it is always flattened beneath, the venter being whitish, soft, exceedingly pliant, smooth, minutely adjustable, the specimen fastening itself the leaf of the food-plant by pressing the ventral margins down and raising the centre of the venter. Our small *Cochlidion limacodes* larvae sit on the leaf of the food-plant like small green knobs or galls, being sometimes so well fastened that they can hardly be moved with the finger. The head lies beneath the projecting thorax, into which it is retracted at rest, so that is disappears in a dorsal aspect under the shield-like back, which renders it difficult to decide which is forepart and which anal end. Also the caterpillars which are not evenly elliptical in outline like our European species, have the peculiar markings and ornamentation usually so arranged that fore and aft look the same. The larva of *Parasa consocia Walk.*, e. g., represents in dorsal aspect a regular oblong with rounded corners, a pair of spiked clubs projecting anteriorly and an exactly similar pair posteriorly.

The larvae spin for pupation an entirely uniform cocoon like paper, which sometimes bears an ornamentation rendering it similar to a bird's egg. Pupation does not at once take place in the cocoon, but the larva remains for weeks or even month in the state ofa sort of propupa, i. e. being soft, discoloured, contracted, and not entirely unable to move, even rather mobile when molested. If the cocoon is injured during this period, the larva is often able to spin up the hole, which proves that the faculty of spinning remains with the larva for a while at this stage. Only in the preceding family, the *Megalopygidae*, a similar phenomenon obtains.

When the insect has at last turned into a chrysalis, this exhibits also a number of characteristics. Although little different in shape from other pupae, except that it is very broad and obtuse at the anal end, the sheaths of the antennae, wings and legs are not soldered to the body, but are free as in the pupa of a beetle, such a pupa being called "pupa libera" in contradistinction to the "mummy pupa".

The moths are stout, with short abdomen, which does not or scarcely reach the anal angle of the hindwing. Wings rounded, often very brightly coloured, sometimes adorned with gold and silver spots, but usually with simplified markings. The legs as a rule bear very uniformly long brush-like hair; the tarsi also being hairy, the last segment with the claws being covered over and the tarsus having the appearance of ending with a pencil of hair. Sometimes these tarsi, which recall the paws of a cat, are a counterpart to the abnormally developed palpi, which project in the shape of pencil far beyond the head of the insect at rest.

Head broad; eyes large and globular; frons woolly; antenna of ♂ usually pectinate proximally, apex simple. Thorax globular, broad, smooth-hairy; abdomen stout; tibiae spinose and like the tarsi with strong crests of hair. Wings very evenly oval, entire, with long fringes; costal vein separated from the costal edge, midway between this and the subcostal; cell broad at the apex; discocellular usually strongly angulate; a vein extends from it down the cell to near base and sometimes appears as a continuation of one of the radials, being occasionally forked, the 2 branches joining the two radials; the submedian of the forewing is forked at the base, which is evidence for two veins having become merged together. The position of the veins, which are nearly all equidistant from one another, reminds one superficially of certain Neuroptera.

The family is distributed over all the continents; but Europe with its 2 species and Northern Asia with 8—10 appear exceedingly poor; North America has about 30 species, Japan about 15, and Amurland about 9. One of the largest species, *Natada velutina Koll.*, described from Kashmir, reaches there Palearctic territory; its expanse is sometimes more than 70 mm. Most other species are small or medium-sized; some, like the European *Heterogenea asella Schiff.*, have the facies of Tortricidae and are very inconspicuous. From the whole of the Palearctic Region nearly 50 forms are recorded.

Many larvae of Limacodids urticate, some very strongly so. The Australian *Doratifera vulnerans* has received its name from this offensive character. The cocoon is so spun by the larvae that the head-piece comes off as an even lid when the moth emerges, which characteristic brings the Limacodids in close connection with the preceding family. The moths fly by day in the sun or at night, the flight being wild, undulating and whizzing.

1. Genus: **Scopelodes** *Westw.*

The 10 species hitherto recorded of this Indo-Chinese genus are perhaps for the greater part forms of a few species only. They are recognised by the abnormally long palpi, which project like two truncate tufts from the head forward, being slightly divergent. Thorax and forewing as well as basal area of the hind wing covered with a dense pelt of hair-scales; the hind legs terminate likewise in truncate paws. The antennae are bipectinate to the centre in ♂, then simple. Mid tibia without spurs. On the forewing the recurrent cell-vein almost reaches the wing-base; discocellular so deeply angulate that the apex of cell is divided into two lobes; of the subcostals veins 7, 8, 9 stalked together; from the lower submedian vein to the hind margin numerous thin veins. — The larvae are thick, plump, clumsy, on the back two rows of tubercles shaped like spiked clubs. The moths are rarely met with at rest by day, but are sometimes beaten from the branches hanging over the roads, from which they whir down to the ground, where they remain for a while. All the species occur in India, one being recorded from North China.

venosa. **O. venosa** *Walk.* (= ursina *Butl.*, aurogrisea *Moore*, testacea *Butl.*) (30 d). This form has been recorded from Japan; it is otherwise Indian, being distributed throughout Anterior India and extending probably to Kashmir, thus crossing the Palearctic boundary in Central and East Asia. The various forms have been based on differences in the wing-colour, which varies exceedingly, even in one and the same locality. The darkest form, with the forewing almost black-brown, is *venosa*; the Indian *testacea* is paler, more red-brown; still lighter, sometimes sandy-yellow or dust-grey, is the South Indian (Ceylonese) *aurogrisea Moore.* The Kashmir *ursina.* form is probably the dark brown **ursina** *Butl.* — Larva green, yellow beneath, on the back rows of setiferous warts, segment 8 bears a red-white-blue transverse stripe, and 11 a black spot. The cocoon is ovate, brown, with dark markings. The moths are much attracted by the lamp; they were on many nights the only species which came to the light after 10 o'clock, wildly circling round the lamp. They are very difficult to find by day, as they rest in a peculiar position closely appressed to branches, resembling a rolled-up young leaf; head and thorax are raised and the wings held close together posteriorly; the palpi are stretched forward and resemble small leaf-stalks.

contracta. **S. contracta** *Walk.* (50 b). Like the preceding very variable in size, but usually considerably smaller, also more constantly grey-brown; on the forewing cell and distally the interneural spaces darker. — North China, Japan (Hondo); allied forms also in India.

2. Genus: **Hyphorma** *Hbn.*

The only species of this genus has the prolonged palpi of *Scopelodes*, but they are different in structure. While in the previous genus segment 2 is upturned in front of the face and 3 directed obliquely upwards, provided with a tuft and longer than 2, in the present genus segment 2 is longer than 3, both have the same direction, being horizontally porrect, and have no real apical pencil. In neuration *Hyphorma* is distinguished by the forked cell-vein, and by the cell-apex not being bilobate, the discocellular being less deeply angulate. — The moths are not rare in India; Walker also gives North China as habitat, and for that reason we mention the species here; but the record is doubtful.

minax. **H. minax** *Walk.* (50 b). Body and head with reddish golden brown hair. Wings light umber-brown with dark shadow from near apex to hind angle, and an oblique line from the costal end of the shadow to the apex of cell. India. — We figure the species from the type in London, as North China was given as patria. But I have not found the species there, and Leech does not mention it. Probably we have to do with a mistake in labelling, as Walker has also recorded from "North China" other species which certainly come from India, e. g. *Dudusa nobilis Walk.* a. o.

3. Genus: **Microleon** *Butl.*

The only species of this genus resembles our *Cochl. limacodes* in colour and markings, but the body is much more delicate, slenderer, the abdomen longer, the forewing broader, and, above all, the palpi longer and upturned, although not approximately so long as in the two previous genera. — Only 1 species is known.

longipalpis. **M. longipalpis** *Butl.* (50 a). Usually smaller than our *C. limacodes*; the body almost as delicate as in a Geometer, the thorax narrow; the palpi porrect, projecting by more than the length of the head, pointed, without apical tuft. Forewing yellowish brown at the base, apex and the centre of the hind margin, otherwise shaded with violet-grey. The hindwing grey, with pale fringes. In facies similar to the somewhat larger *Phrixolepia sericea Butl.* from the same country. — Corea and Japan (Satsuma, Hondo).

4. Genus: **Phrixolepia** *Butl.*

This genus is purely Palearctic, since *invicta Walk.* from Borneo certainly does not belong here. There are hardly any structural differences from the next genus, only the forewing is more pointed, with slightly curved distal margin; however, the wing-contour differs more in the two species of *Phrixolepia* than in *nobilis* and *Cochl. limacodes.* Both species are somewhat larger than the European *limacodes* and have a slight metallic gloss. STAUDINGER, however, has already said that the separation of *Phrixolepia* from *Cochlidion* is artificial.

sericea. **P. sericea** *Butl.* (= Lim. castaneus *Oberth.*) (49 k). Forewing bright golden brown, traversed by a narrow white band which is proximally dark-bordered and behind cell elbowed at right angles. — Larva probably on Juglans mandschurica, as KORB repeatedly found the species at rest at this tree. Its posture is similar to that of *Cochlidion limacodes*, the forelegs being stretched forward, the wings folded together so that the outer margins touch, and the abdomen raised. — Distributed in East Asia; in Amurland on the Su-chan and at Vladivostok, on Askold, andin Japan on Hondo and in the Hokkaido; in July, usually not rare.

nobilis. **P. nobilis** *Stgr.* (49 k). This species, discovered by CHRISTOPH in Amurland, appears to be rare. Before the marginal area of the forewing there is a dark shadowy band which is traversed throughout its length by a paler line.

5 Genus: **Cochlidion** *Hbn.* (Limacodes *Latr.*)

According to the extent adopted for this genus, it contains 5 to 20 species. Only a few forms occur on Palearctic territory. Body and wings everywhere rounded, the forewing with a very long cell which is divided at the apex into 2 lobes by the intracellular vein. ♀ much clumsier than the ♂. — Larva strongly convex, short wood-louse shape, with but feebly raised subdorsal longitudinal carinae, without urticating hair, with small concealed head. — The ♂♂ fly by day in the sun, the ♀♀ mostly at night. They have only one brood, one of the species being in temperate Europe one of the commonest moths.

limacodes. *suffusa.* *maculata.* *ochracea.* *limax.* *bufo.* **C. limacodes** *Hufn.* (= testudo *Schiff.*, asella *Esp.*, testudinana *Hbn.*, avellana *Kirby*, sulphurea *F.*, funalis *Don.*) (49 k, 50 a). Very variable; the ♂ usually chestnut-brown, more or less suffused with russet-black (**suffusa**), sometimes irregularly spotted with yellow (**maculata**), the ♂ uniformly yellow like the ♀ (**ochracea**), mostly with large yellow patch above centre of hind margin (**limax** *Borkh.*), or yellowish brown with dark median band (**bufo** *F.*), according as one likes to define the forms and name them. In most specimens of the ♂ there are three spots on a dark brown ground, one in front of the hind angle, another before the apex and a third in the centre of the oblique median band. ♀ yellow to brown, the median band only indicated by the brown borders, an oblique line usually runs from two-thirds of costal margin to the hind angle. — Larva scutiform, semiglobular, bright yellowish green, with a yellow subdorsal and lateral line, the ground between them lighter. In the autumn on deciduous trees, especially high Oaks, on the underside of the large hard leaves of the lowest branches, being difficult to obtain by beating, often falls off with the autumn-leaves in October. It then spins a rosy red ovate cocoon, in which it remains in a contracted state until April, when it turns into a chrysalis. The moth appears the end of May and can be beaten from deciduous trees. The ♂♂ swarm by day in sunshine along the edges of woods, the flight being wild. In Europe from Scandinavia and Livonia to the coasts of the Mediterranean, and from the west-coast to the Black Sea and Asia Minor. Abundant.

christophi. **C. christophi** *Graes.* (49 a). Exactly marked like the ♀ of *limacodes*, but on a bright reddish chestnut-brown ground. The species, as the figure shows, is considerably slenderer and more delicate, the wings broader in proportion to the slender body, with the costal margin more curved and the apex more pointed. In these particulars *christophi* approaches in build the much smaller *H. asella Schiff.* — On the Ussuri, in July; apparently not common.

codeti. **C. codeti** *Oberth.* (50 a). As large as or larger than *testudo*, light red-brown to leather-yellow; the markings differ from those of the externally similar *limacodes* in that usually only the proximal border-line of the middle band is sharply marked. — Mauretania. STAUDINGER's diagnosis "major, dilutior" applies only to some specimens.

angulata. **C. angulata** *Fixs.* In facies similar to a large ♀ of *limacodes*, but the forewing with very sharply marked hind angle, and the border-lines of the median band only distinct in the posterior half. On account of the wing-contour, a thoracical hump and crested abdomen the species has beeen placed in a special genus, called *Rhamnosa* in the text by Fixsen, and *Ramesa* on the plate, there being no definition and the name being marked with ? As the species is unknown to me in nature, the form is placed here, being doubtless closely related to *Cochlidion*.

6. Genus: **Heterogenea** *Knoch.*

Very small and inconspicuous moths, which are restricted to the northern hemisphere, being represented in the Palearctic Region by three species and in North America by one. Usually slenderer and more delicate than the species of *Cochlidion*; the antennae simple also in the ♂, not serrate. The forewing frequently more acute, distally broader, with the distal margin much longer, the fringes long, the cell shorter. — The larvae smaller, less convex, more variegated, but otherwise similar to those of the preceding genus. The moths have but one brood. The ♂♂ fly early in the summer by day in the sunshine; their flight, however, is not wild and whirring, but slower and more straight on account of the slenderer body and broader wings, the moth resembling on the wing a Tortrix. They do not occur anywhere so abundantly as the species of the previous genus, being in many districts even very rare.

asella. **H. asella** *Schiff.* (= cruciata *Knoch.*, asellana *Hbn.*) (50 a). The smallest known Limacodid. Forewing almost uniformly dark brown, the hindwing still somewhat darker, blackish, or both wings uniformly dark *nigra.* brown (= ab. **nigra** *Tutt*); the fringes of both wings yellowish. — Larva dark green, with red-brown dorsum marked with a yellow herringbone pattern; in the autumn on deciduous trees. The moth in June and July usually not common, and also easily missed on account of its similarity to a Tortricid. I obtained the species nearly always only when collecting Micros.

uncula. **H. uncula** *Stgr.* (49 k). Considerably larger, of a white ground-colour; the forewing with a split up middle band, the hindwing shaded with grey, whitish basally. From the Amur, Northern China and Japan *fulgens.* (Hondo and Hokkaido). — **fulgens** *Leech* (50 a) appears to be only a light-coloured form of this species, in which the middle band is reduced to sparse vestiges. Recorded from Gensan in Corea, and Ningpo; in June and July. — Korb obtained *uncula* several times at the lamp, and found the species by day at rest on Phellodendron and Juglans mandschurica.

dentatus. **H. dentatus** *Oberth.* (49 k). Very different from the preceding species and in spite of the simple antenna of the ♂ nearer to *Cochlidion* than to the other *Heterogenea*. Forewing less broad than in *uncula* and much less pointed than in *asella*; more variegated, markings bright, with whitish curved stripes before the apex and hind angle and dark oblique shadows before and in the centre. — From June until the end of July, at distributed from Vladivostok and Askold towards the South, on the peninsula of Sidemi. Not abundant.

7. Genus: **Susica** *Walk.*

Relatively rather large moths, with thick thorax, very broad forewing and long fringes to the hindwing. Head broad; palpi porrect, segment 1 short, 2 long, 3 very small. Antenna pectinated in ♂ to beyond two-thirds. Forewing oval, with rounded apex; of the 5 subcostals 1 branches off close beyond middle of cell, 2 before apex of cell, 3—5 on a common stalk from upper angle. — The few species which belong here are restricted to India, with the exception of one, which is also distributed in China.

pallida. **S. pallida** *Walk.* (= Tadema sinensis *Walk.*) (49 k). Dull yellowish earth-brown, coarsely scaled, minutely dotted, with the outer margin of the forewing rather strongly ventricose; from before the apex a thin line angulate near cell-end runs towards hind angle, which it does not reach; from the same point an oblique shadowy line extends to the hind margin, which it reaches at one-third; basally to this line the wing is darker, particularly in the ♂. — Not rare in Japan, China and India, distributed from Yamato and Yokohama (Leech) over Formosa, the greater part of China to Moulmein. The caterpillar on Pear (Pryer).

8. Genus: **Altha** *Walk.*

The rather small species which belong here are Indian, only one extending farther north and reaching Palearctic territory in Kashmir, where however it does not appear to be common. All the species are very conspicuously coloured, being white or bearing a velvety patch which occupies nearly the whole forewing. These small moths have a broad head, the ♂-antenna bipectinated to two-thirds, the thorax broad and woolly, and the abdomen stout. The forewing triangular, with the costal margin somewhat incurved and the apex rectangular; the discocellular obtusely angulate; the subcostal branch 2 and the stalk of 3—5 together from upper angle of cell; the recurrent cell-vein which emanates from the cross-veins about reaches to middle of cell.

nivea. **A. nivea** *Walk.* (= Belgoraea subnolata *Walk.*) (50 a). Snowy white, on the forewing indications of thin transverse lines and greenish brown small spots in and below the cell. — India, north-westwards to Kulu.

9. Genus: **Natada** *Walk.*

About 12 species are known of this genus, among which are the largest and heaviest forms of the whole family. These latter are not unlike in facies to *Scopelodes*, but have, in contradistinction to them, very short palpi, which only slightly project from under the hair of the frons. Antenna of ♂ usually with very short pectinations to the apex. Hind tibia with 2 pairs of spurs. The cell of the forewing broad and its apex two-pointed an account of the angulate cross-veins; the wing itself rounded. — The genus is predominantly Indian, and must not be confounded with the Notodont genus *Nadata*.

velutina. **N. velutina** *Koll.* (= rugosa *Walk.*) (50 a). The largest Limacodid, being somewhat larger than the species of *Scopelodes* and even surpasses in size the large American *Sibine*. The strongly rounded forewing very dark red-brown, with a silky gloss in places where the scales are erect, these places having "the appearance of ruffled seal-skin" (Hampson). The apical line from near apex to the hind margin near base dark, pale-bordered on outer side and curved below costa. — Kashmir, throughout the Himalayas and North India, one of the commonest Limacodids; in the spring until May and again in August and September, from 1000 to 5000 ft.

nararia **N. nararia** *Moore* (= cosmiana *Swinh.*, suffusa *Moore*, fraterna *Moore*) (50 a). Light brownish yellow. The transverse line of the forewing separates the outer third from the basal two-thirds, the latter more reddish. — From Kashmir to Southern India. In Ceylon occurs a race whose forewing is suffused with a dark tone and bears sometimes a dark cell-spot. — Larva above greenish yellow, below pink; with a light yellow, sometimes reddish dorsal band which is divided by a green stripe; dorso-laterally and laterally rows of green processes, the upper ones with red tips, and the anterior and posterior ones longer than the others. The cocoon ovate, purple-brown or yellowish brown, rather irregular according to the only figure published of it.

conjuncta. **N. conjuncta** *Walk.* (= neutra *Swinh.*, fimbriares *Walk.*, cuprea *Walk.*) (50 b). Thorax and forewing dark red-brown, with a coppery or silky gloss; forewing with short raised lines of scales; at apex of cell a blackish dot; a band constricted in centre, widened in front and behind, coppery before the outer margin. Hindwing light brown. — In the Himalayas, southward to Siam and extending northward, in Northern China, into the Palearctic Region.

10. Genus: **Thosea** *Walk.*

About a dozen moderately small moths are united under this name, which were formerly spread over the genera *Aphendala*, *Anzaba*, *Parasa*, etc. Most of them are rather uniformly brown or grey, with bipectinate antennae in the ♂♂ either to the apex or only beyond the centre. Head depressed, thorax robust, abdomen stout, only a little reaching beyond the anal angle. Forewing broad, with almost rectangular apex, subcostals 3, 4, 5 stalked; the discocellular obtusely angulate, the apex of cell being divided into two lobes, of which the lower one is longer on the hindwing. — The genus is distributed in China and India. The larvae are known of several species.

transversata. **T. transversata** *Walk.* (50 b). This Kashmirian moth has on the forewing a dark greyish brown basal area which is separated from the dirty light brown outer area of the wing by a whitish oblique band proximally dark-bordered and outwardly diffuse; the marginal area is traversed by a dark, distally light-edged transverse line. — In the Indian Himalayas (Dalhousie, Murree) an ochreous form occurs, and in Southern India and on Ceylon a mouse-grey race (= *T. cana Walk.*) — The larva green with yellow dorsal stripe, shorter small warts dorso-laterally, and longer ones laterally; the spiracles with light borders. On deciduous trees. Kulu, in May and August. The species occurs up to 4000 ft.

tripartita. **T. tripartita** *Moore.* Very similar to the preceding species, but the basal area of the forewing dark brown, and the line which separates it from the pale outer area is steeper; the submarginal line is more oblique and curves towards the outer margin above the hind angle. — The larva green, like the preceding; with shorter warts at the sides of the back and longer ones above the spiracles; on the back and at the sides rows of blue spots. — Dharmsala, Kashmir, also distributed over a large portion of India.

fasciata **T. fasciata** *Moore* (49 k). Larger than the previous, dirty earth-brown; from the costa to the hind margin 3 shadowy bands, whose position is shown in the figure. — Kashmir; larva not known.

sinensis. **T. sinensis** *Walk.* (= loesa *Moore*) (50 e). Forewing with produced apex, being slightly incurved below it, grey, with a strong ochreous tone in the basal area and beyond the oblique line, the latter running from before two-thirds of the costa almost parallel with the distal margin to beyond the centre of the hind margin. The hindwing entirely ochreous, with the distal margin and the fringe grey. The forewing bears a black dot at the apex of the cell. The fore tibia of the ♂ has a vivid white spot at the tip. — Distributed from China over a large portion of India to Java. The larva green or yellow, with prominent pale dorsal line; at each side of this line and at the sides of the body rows green processes 2 mm long with red tips. The cocoon ovate, brown-grey.

sericea. **T. sericea** *Butl.* Butler has described two not very dissimilar moths under the same specific name, the present species being named by him *Asphendala sericea*, although there was already a *Phrixolepia sericea Butl.*, which has already given rise to confusion of various kind. This is the more easily understood, as his genus *Aphendala* has no legs to stand upon, Hampson having already united it, as well as the so-called *Anzabe*, with *Thosea*. The moth described as "*Aphendala sericea*" is said to have ochreous forewing with the transverse band crossing the posterior median area curved, not elbowed as in *Phrixolepia*. But it is doubtful whether the species belongs to the *Limacodidae*. There are altogether no less than half a dozen *Limacodidae* which bear the name of *sericea*, mostly with Butler as author, viz., a *Scopelodes*, a North Indian *Cania*, a species from South America and one from Madagascar, in addition to the above. — The Japanese *sericea* is said to occur on Hondo and in the Hokkaido. The species is not before me.

11. Genus: **Cania** *Walk.*

Near the preceding genus and *Altha*; apex of forewing strongly rounded, hindwing with very long fringes. In the forewing subcostal 1 almost from middle of cell, 2 far before cell-apex, 3 and 4 stalked. — Only a few species, nearly all from India.

bilinea. **C. bilinea** *Walk.* (= sericea *Walk.*, Miresa mollis *Walk.*, Nyssia malaccana *Walk.*, Aspidiotus bicarinatus *Walk.*) (50 c). The moth varies very much in size as well as colouring. Sometimes lighter brown, sometimes dark, so variable that Walker placed the species into 4 different genera. Recognised by 2 parallel pale oblique lines with dark proximal borders. The brown colour of the forewing either more reddish or more yellowish or more grey; head and collar with a tone of yolk-colour. Hindwing ochreous, sometimes paler, sometimes duller or darker. — The moth occurs in China as well as in Kashmir on Palearctic territory, and is probably found throughout Southern Tibet, being moreover widely distributed in India.

12. Genus: **Miresa** *Walk.*

Palpi abnormally long in one of the species, in the others short, porrect, but so small that they do not extend beyond the brush of the frons. Antenna of ♂ long-bipectinate to two-thirds, short-bipectinate in apical third. Apex of forewing rounded, but the wing nevertheless more triangular than the oval wing of *Cania*; subcostal 1 before apex of cell, 2 at apex, 3, 4, 5 stalked; discocellular strongly angulate, the cell-vein terminating between the two radials. In the forewing the cell is divided into 2 almost equal parts, in the hindwing into a smaller upper portion and a larger lower one. — The extent of the genus is very different according to the views of the authors; it comprises nowadays about 20 forms, *Monema flavescens Walk.*, which deviates in its long palpi, being included in this number.

albipuncta. **M. albipuncta** *H.-Schäff.* (50 b). Forewing uniformly red-brown, paler towards outer margin, before apex of cell a glossy white discal dot which is traversed by an outwardly concave dark line; a second line commences before the middle of the costa and runs to the hind margin, which it meets soon beyond the base. Hindwing and abdomen pale yolk-colour. The Kashmirian form is rather small. The species is widely distributed in India, but the Burmese form is considerably darker according to Hampson. — *guttifera.* **guttifera** *Walk.* is larger, has a prominent, more distinctly double central dot on the forewing, and the transverse lines may be diffuse or absent. — Larva green, dorso-laterally 2 rows of spiny warts and another row of shorter ones above the spiracles. A brown spiracle-line, and a lateral one below which the ground-colour is paler.

inornata. **M. inornata** *Walk.* Very similar to the preceding, but duller red-brown. The white spot and the dark median line are absent; on the other hand, a dull indistinct submarginal line is developed. — In Japan, China, Kashmir; also in the North of non-Palearctic India.

flavidorsalis. **M. flavidorsalis** *Stgr.* (49 k). Can hardly be united with the preceding species, as Staudinger suggested. Recognised by the basal portion of the hind marginal area being bright yolk-colour, this area being bounded *fuscicostalis.* by a pale curved presubmarginal band. — **fuscicostalis** *Fixs.*, which is a distinct species according to Graeser, has the yellow colour extended over the whole forewing with the exception of the costal margin as far as apex of cell. — Amurland, North and Central China, and Corea, in July, not rare in some places.

pallivitta. **M. pallivitta** *Moore.* This form, described from Shanghai, perhaps belongs to the very variable previous species. I have not been able to find it at Shanghai and know it only from Moore's description. According to this the forewing is light ashy grey, the hindwing greyish brown.

flavescens. **M. flavescens** *Walk.* (50 c). This common East Asiatic species belongs certainly not here, as is abundantly proved by the abnormally developed palpi, which point to a genus near *Hyphorma*. The cocoon being marked like a bird's egg points in the same direction. I do not know the cocoon of *Hyphorma mina* x, but have found cocoons of the closely allied genus *Scopelodes* which also show the peculiar markings like the veining of wood. Therefore, the genus *Monema* must be considered valid, but the name has been rejected as preoccupied. — The wing-contour issimilar to that of the other *Miresa*. Forewing yellow on the proximal half, this colour gradually fading away into the brown outer area. A distinct central dot may be present on the forewing and also a subbasal line, a median one and a submarginal one, from the costal end of the submarginal line a thin oblique line sometimes run to the centre of the wing; but all the dark lines also may be quite thin or indistinct. A specimen obtained by in Japan in July byme beating has especially prominent markings, the yellow colour contrasting more strongly with the chestnut outer half, while my specimens from North China are more uniform in colour and almost as dull in marking as the examples from Amurland. My Japanese specimen is a captured one, while I bred the Chinese ones, and this might therefore explain the difference. — The larva is green with broad violet-brown dorsal stripe, and armed with setiferous warts; it feeds on deciduous trees, particularly Elm, and rests on the underside of the leaves. Korb figures the larva, the setiferous tubercles being distinct in the figure, long on the anterior and posterior segments, and much shorter on the central ones. The dorsal stripe is irregular, being widened on the thoracical segments in the shape of a shield. The caterpillar spins in the autumn a very pretty whitish cocoon, with markings like a bird's egg consisting of minutely divided dark longitudinal splashes, the cocoon being thus rendered similar to that of the Javanese *Setora nitens*. In this cocoon the larva remains till the next June without changing into a pupa. The species is exceedingly numerous, the larvae occurring in abundance on all kinds of deciduous trees, but full-fed larvae are often parasitised. The cocoons have lately been brought to Europe in quantities, but only a few give results, many dying because the unchanged larva appears to suffer much more from transport than the pupa.

13. Genus: **Parasa** *Moore* (Neaera *H.-Schäff.*).

This is one of the most conspicuous and beautiful genera among all the Heterocera. Their chief ornament is the magnificent apple-green colour of the forewing, which very effectively contrasts with the brown or violet basal and marginal markings. The colour is protective and much more efficient than one might be inclined to think on viewing a set specimen. When I was once occupied searching for larvae I examined with the eyes a young tree very carefully and at some length and noticed a copulating pair of *Parasa consocia* on the underside of a leaf. In order to beat it down I knocked against the branch, with the result that more than 30 specimens fell down. Of this number of bright-coloured moths I had only perceived 2 with my eyes, so effectively had they been concealed by their leaf-green colouring! Some larvae of *Parasa* urticate considerably, the poisonous hairs being situated on the anterior and two posterior tubercles. The sting is as painful as that of a bee, and the pain lasted with me 3—4 hours. Herr L. Klaphek told me that he still felt the sting the next day, so that the intensity of the effect appears to be different with different persons. In spite of this excellent weapon the larva is sometimes parasitised, but is apparently avoided by reptiles and birds. It is green, but easily visible (in contradistion to the moth) on account of its queer, somewhat oblong, shape, and remains evidently unmolested. I have seen the larvae of *P. consocia* leave the eggs, gradually disperse in clusters over the tree and nearly all arrive at the pupal stage; very rarely a larva was missing, and at the end of the season the trees attacked by them were denuded of the last leaf.

Kirby already enumerated more than 50 species of *Parasa* in 1890, of which however many will be treated as varieties as soon as the larvae have become known. But it is quite certain that a large number of hitherto unknown species are in existence, Africa, which is so little explored as to its Heterocera, the interior of Madagascar, the Indian Archipelago and, above all, Farther India being promising countries. Moreover, many a fine moth so far known only as purely Indo-Australian will be added to the Palearctic fauna when the boundary districts of our Region are better explored. In continental British India alone no less than 14 species have been found, many of which may be expected to occur across the border on Palearctic territory. Particularly the exploration of Tibet promises a rich harvest. Of the continents only Europe, Australia and South America are so far devoid of true *Parasa*; the genus is poorly represented in North America; in Africa south of the Sahara the species are very numerous, but they are entirely absent from the districts north of the Sahara.

Head of medium size, frons flat-truncate. Palpi short, porrect, segment 3 very small. Antenna of ♂ serrate or in proximal half bipectinate. Thorax smooth-hairy. Abdomen woolly, rough-hairy, short and stout, obtuse and strongly humped. The forewing variable in shape from being almost oval to obtusely triangular. The legs short, strong, densely hairy, the tarsi hairy, obtuse at tip. In the forewing subcostals 1 and 2 near apex of cell, 3, 4, 5 stalked; the discocellular sfrongly angulate, the intracellular vein dividing the cell into a larger upper portion and a smaller lower one. In the hindwing the lower portion of the cell is the larger one.

The larvae are scutiform, sometimes oblong on account of the presence of prolonged tubercles laterally at the fore and hind ends; the poison hairs soft, sometimes restricted to those longer protective tubercles, sometimes evenly distributed over the dorsal and lateral warts, in the young larva more evenly dispersed and thinner, in the adult denser and more localised. The pupa in an ovate cocoon, which is frequently concealed on the ground or under leaves. The moths fly at night, and rest by day on the underside of leaves, from which they can be beaten.

consocia. **P. consocia** *Walk.* (= tesselata *Moore*, princeps *Stgr.*, humeralis *Swinh.*) (50 e). Thorax, head and forewing apple-green, on thorax often a violet-brown line. Base of forewing with brown spot angulate on the median vein; distal margin pale yellow for a width of 2 mm.; abdomen and hindwing the same colour. Exceedingly variable, the distal border now narrower, now broader, uniformly yellow, or dusted with brown, or traversed by brown veins and a brown line in its centre, the proximal edge of the yellow marginal band usually somewhat convex above the hind angle, but sometimes almost even, or projecting proximad as a tooth below costal margin. — Larva adult yellowish green, with minute paler markings, on the back a sky-blue black-spotted longitudinal band; the dorsolateral tubercles green, those placed above the spiracles with orange-yellow tips, especially prominently yellow on the first thoracical segment. At the hind end 4 deep black spots, 2 almost contiguous on segment 12 and the other 2 more separate on 11. On deciduous trees, in South-East Asia, full-fed in June and September, in the North presumably one brood only. The moth in July and October, abundant in the South of it area. Apparently distributed throughout China, northward to Amurland, Corea and Japan.

pastoralis. **P. pastoralis** *Butl.* (50 c). This form appears to represent the preceding one in the western districts. The yellow distal border more even and considerably broader; the brown basal spot extends to near the centre of the wing and bears a yolk-yellow suffusion at the base. — Kashmir and the Indian Himalayas. One of the largest Indian species.

lepida. **P. lepida** *Cr.* (= media *Walk.*, graciosa *Westw.*, latifascia *Walk.*). In this moth the broad distal border is proximally quite straight, and the basal spot is marked only below the costal edge, not reaching the hind margin. — Kashmir; widely distributed over British India and Ceylon to the Sunda Islands. The larva, similar in shape to that of *P. consocia*, is differently coloured according to the food-plant; those feeding on the coffee-plant almost uniformly light green, those on tea more yellowish green, with broad brown-violet dorsal stripe. The yellow eggs are deposited in clusters.

hilaris. **P. hilaris** *Westw.* (= laeta *Westw.*, hockingi *Moore*, mirza *Swinh.*) (50 c). Near to the previous, but the violet outer border very broad, occupying the whole marginal area, its inner edge curved; the brown basal spot vestigial. — Kashmir, in India common throughout Southern India and Ceylon. I still found a specimen in the Nilgiris at a considerable altitude, at Utacamund.

sinica. **P. sinica** *Moore* (= hilarula *Stgr.*) (50 c). Very close to the preceding form, but with distinct basal spot, angulate on the median vein, and (in ♂) dark brown hindwing. — Larva light green, with numerous yellow transparent granules on which small black spines are placed. These spines occasion a "burning pain on the human skin which is similar to the pain inflicted by nettles, but much more acute and often lasting for days" (Graeser). Korb says on the contrary that the larvae are quite smooth, green, with violet stripes. But as the setiferous tubercles are the places which bear the urticating hairs and Graeser describes the effect of the urtication one of the two observers must have made a mistake. — In Amurland and Corea, and in Japan on Hondo and in the Hokkaido, abundant in same places.

hilarata. **P. hilarata** *Stgr.* (= sinica *Stgr.*) (50 c). Very similar to the preceding form, but larger, the hindwing of the ♂ pale yellow, slightly brownish at the outer margin, not mouse-grey as in the preceding moth. — This form might be considered a variety (seasonal ?) of the preceding species, if Graeser had not described the larvae as being quite different. The caterpillar of *hilarata* is light green with blue marking on the back (i. e. more similar to *consocia*). In the autumn on Oak, Birch, Sloe and other deciduous trees. The moth in July, common, in Amurland, and on Hondo in Japan.

inexpectata. **P. inexpectata** *Stgr.* At once distinguished from all the other green Palearctic *Parasa* by the very narrow brownish distal border of the otherwise entirely green forewing, the border being almost restricted to the fringes. Only the Indian *bicolor* is similar in colouring, having the forewing entirely green. — In Southern Asia Minor (Akbès).

14. Genus: **Arctioblepsis** *Feld.*

Head, thorax and shape of forewing recalling *Scopelodes*, but the palpi and antennae are absent in the only known specimen on which Felder based this genus. Proboscis of medium length. Forewing elongate, median cell about reaching to middle of costa, subcostal with 5 branches, 1 and 2 thrown off before apex of cell, 3 and 4 on a long stalk banching off far beyond cell; discocellular strongly angulate; the first median branch originating before the middle of forewing. Legs long and thin, clothed with smooth hair-scales; hind tibia with 4 long spurs. Abdomen slender, extending little beyond the hindwing.

rubida. **A. rubida** *Feld.* This moth, which is unknown to me in nature, is described by Felder from a very imperfect specimen from the Ningpo Hills in Tse-king. Antennae and palpi wanting; the author only says of the moth that it is one-third smaller than Westwood's *Scopelodes unicolor*, according to which the expanse would be about 30—40 mm; the wings are flesh-red, the forewing lighter, with black veins. As he adds that the moth has the facies of a Lithosiid and recalls "*Bizone*" (cf. this vol. p. 61 [Chionaema], pl. 11 a—c), it remains doubtful, if this species is correctly placed here. The species bears only some similarity to *Scopelodes* of all the genera of this family. But the description of the legs does not give one the impression that the similarity is real, since the legs of *Scopelodes* are very peculiar.

Alphabetical List

of the Palearctic forms of *Limacodidae* with references to the original descriptions.

* signifies that the species is figured at the place cited.

albipuncta *Mir. H. Schäff.* Außereur. Schmett. 1. *
angulata Cochl. *Fixs.* Rom. Mém. Lép. 3. p. 339. *
asella Heter. *Schiff.* Wien. Verz. p. 65.

bilinea Can. *Walk.* Cat. Lep. Het. Br. Mus. 5, p. 1142.
bufo Cochl. *F.* Mant. Ins. 2, p. 121.

christophi Cochl. *Graes.* Berl. Ent. Zeitschr. 1888, p. 119.
codeti Cochl. *Oberth.* Bull. Soc. Ent. Fr. 1883, p. 18.
conjuncta Nat. *Walk.* Cat. Lep. Het. Br. Mus. 5, p. 1150.
consocia Par. *Walk.* Cat. Lep. Het. Br. Mus. 32, p. 481.
contracta Scop. *Walk.* Cat. Lep. Het. Br. Mus. 5, p. 1105.

dentatus Heter. *Oberth.* Diagn. nouv. p. 8.

fasciata Thos. *Moore,* Proc. Zool. Soc. Lond. 1888, p. 103.
flavescens Mir. *Walk.* Cat. Lep. Het. Br. Mus. 5, p. 1112.
flavidorsalis Mir. *Stgr.* Rom. Mém. Lép. 3, p. 195. *
fulgens Heter. *Leech,* Proc. Zool. Soc. Lond. 1888, p. 609. *
fuscicostalis Mir. *Fixs.* Rom. Mém. Lép. 3, p. 337. *

guttifera Mir. *Walk.* Cat. Lep. Het. Br. Mus. 5, p. 1124.

hilarata Par. *Stgr.* Rom. Mém. Lép. 3, p. 198.
hilaris Par. *Westw.* Cabin. Orient. Ent. p. 50. *

inexpectata Par. *Stgr.* Iris 8, p. 293.
inornata Mir. *Walk.* Cat. Lep. Het. Br. Mus. 5, p. 1125.

lepida Par. *Cr.* Pap. Exot. 2. *
limacodes Cochl. *Hufn.* Berl. Magaz. 3, p. 402.
limax Cochl. *Borkh.* Eur. Schmett. 3, p. 449.
longipalpis Micr. *Butl.* Cistul. Entom. 3, p. 121.

maculata Cochl. *Seitz,* Macrolep. 2, p. 341.
minax Hyph. *Walk.* Cat. Lep. Het. Br. Mus. 32, p. 493.

nararia Nat. *Moore,* Cat. Lep. E. I. C. Mus. 2, p. 415.
nivea Alth. *Walk.* Journ. Linn. Soc. Lond. Zool. 6, p. 173.
nobilis Phrix. *Stgr.* Rom. Mém. Lép. 3, p. 196. *

ochracea Cochl. *Seitz,* Macrolep. 2, p. 311.

pallida Sus. *Walk.* Cat. Lep. Het. Br. Mus. 5, p. 1113.
pallivitta Mir. *Moore,* Ann. Mag. N. H. (4) 20, p. 93.
pastoralis Par. *Butl.* Ann. Mag. Nat. Hist. (5) 6, p. 63.

rubida Arct. *Feld.* Wien. Entom. Mon. 6, p. 33.

sericea Phrix. *Butl.* Ann. Mag. Nat. Hist. (I) 20, p. 476.
sericea Thos. *Butl.* Trans. Ent. Soc. Lond. 1881, p. 595.
sinensis Thos. *Walk.* Cat. Lep. Het. Br. Mus. 5, p. 1093.
sinica Par. *Moore,* Ann. Mag. Nat. Hist. (4) 20, p. 93.
suffusa Cochl. *Seitz,* Macrolep. 2, p. 341.

transversata Thos. *Walk.* Cat. Lep. Het. Br. Mus. 32, p. 195.
tripartita Thos. *Moore,* Trans. Ent. Soc. Lond. 1881, p. 376.

uncula Heter. *Stgr.* Rom. Mém. Lép. 3, p. 197. *
ursina Scop. *Butl.* Ill. Lep. Het. Br. Mus. 6, p. 3. *

velutina Nat. *Koll.* Hüg. Kaschmir 4 (2), p. 473.
venosa Scop. *Walk.* Cat. Lep. Het. Br. Mus. 5, p. 1105.

21. Family: Heterogynidae.

We interpolate here a group of moths, or rather a single species, which does not well fit into any other family. It is a peculiarly specialised insect which perhaps may best be considered a modification of the Zygaenid-type. Kirby places the genus *Heterogynis* in between the *Orgyia*-like Lymantriids and the Psychids, while Staudinger and Rebel bring it after the Arctiids, with which it has nothing to do, and near the Zygaenids, which is more correct. We place it in front of the Psychids, because we are of opinion (cf. this volume p. 351) that the Psychids themselves are secondarily modified derivations from other families.

The ♂♂ of *Heterogynis* a small and unicolorous day-flying moths with thin scaling; the ♀♀ are maggot-like, not being very different from the caterpillar. The patria is South-West Europe and the opposite North-West Africa. The genus extends eastward to Istria and the Herzegovina, northward to Switzerland and South-West Germany. It differs from all the *Zygaenidae* in the complete reduction of the proboscis and palpi, which cannot be used for feeding; from the genus *Zygaena*, moreover, it is distinguished by the antenna being long-pectinate. In facies there is some similarity with the Zygaenid genus *Procris* (= *Ino*, *Atychia*), from which *Heterogynis* is probably derived. The venation is not constant and offers no evidence for the systematic position of *Heterogynis*.

Genus: **Heterogynis** *Ramb.*

The ♂-sex small, grey, semitransparent moths similar in facies to a *Zygaena*, the wings more hairy than scaled, the body slender, the antenna of ♂ plumose-pectinate, the head small, without proboscis and almost obsolete palpi; the maggot-like ♀ with entirely atrophied mouth-parts, wings and abdominal legs, and with mere vestiges of the thoracical legs as short obtuse stumps. — The larva strongly recalls those of *Somabrachys*, but has only 4 pairs of abdominal legs besides the anal pair; short, plump, with swellings, concealed head, and small warts bearing small white bristles. They live exposed on various plants, especially Papilionaceae such as Genista, Sarothamnus and Colutea and pupate in a dense but soft cocoon. The ♂♂ fly in the sunshine on open places, which are very restricted and dispersed and where also the caterpillars are to be found. The ♀♀, like those of many *Orgyia* (e. g. *O. dubia*), do not leave the cocoons, in which they also deposit the eggs. It is here not the place to decide whether there are more than one distinct species. According to the very intrinsic researches of Dr. Chapman, who has selected this group for special study, the forms are very variable according to locality, which is observed either in the moths, or more particularly in the caterpillar and in bionomic characteristics. They have but one brood, and, as far as the observations go, show great resistance to cyanide of potassium, to which fact Herr R. Püngeler drew my attention, remarking that *Heterogynis* agrees therein with the *Zygaenidae*.

paradoxa. **H. paradoxa** *Hbn.* nec *Ramb.* (=penella *Hbn.*, pennella *Dup.*, hispana *Ramb.*, erotica *Grasl.*, padella *Chenu*) (50 f). ♂ in facies nearly like a *Procris*; wings semitransparent, dull russet grey, with long fringes, the costal margin somewhat darker. ♀ maggot-like, stout and glossy, very voluminous as compared with the slender ♂, with the thoracical legs reduced to stumps. The flight of the ♂ somewhat recalls Phryganids. The species has several times been described under different names, and a large number of forms have been named which often differ hardly in anything else but locality and time of appearance. The most widely distributed form is *paradoxa Hbn.*, occurring in Southern France, Southern Germany (Vosges) and Switzerland to Northern Italy and Austria, being also found in Mauretania. — The hardly different form from Spain Chapman distinguishes as *canalensis.* **canalensis**; it is somewhat larger than true *paradoxa*, the wings being more as in *ramburi Kirby* and the fringes shorter; moreover, the two wings are not exactly alike in colour, the hindwing being darker than the forewing. — The form from Southern Spain, *affinis.* **affinis** *Ramb.* (= affiniella *Bruand*) is scarcely distinguishable from it. — *ucedinis.* **ucedinis** *Chapm.*, from the neighbourhood of Ucedo, in Spain, differs from the preceding form, apart from locality, particularly in the cocoon, which is pale, whitish, and about as large as in *ramburi*, i. e. much larger than in true *paradoxa*.. — *ramburi.* **ramburi** *Kirby* (= paradoxa *Ramb.* nec *Hbn.*) (50 f) is considerably larger than true *paradoxa*, and more brown-grey instead of black-grey, and the maggot-like ♀ is much thicker and heavier than the ♀ of true *paradoxa*. Iberian Peninsula. — *piedrasitae.* **piedrasitae** *Chapm.*, from the neighbourhood of Piedrasita in Spain, is hardly different as moth from the preceding form, but the

bejarensis.
candelariae.

colouring of the larva is very variegated and more constant, while it is very variable in *ramburi.* — **bejarensis** *Chapm.* is very dull in colour, blackish with strongly black veins; the larva vivid black-green, with very strong dark markings; from Bejar in Spain. — **candelariae** *Chapm.* is described as another race of *ramburi*, in which the ♂ is smaller and paler and the larva is variegated with bright markings; above Candelaria in Spain. The larva feeds more on Cytisus, while CHAPMAN found that of *bejarensis* on Genista florida. This form rather closely approaches *piedrasitae*, but flies a fortnight later (middle of July) than the other races near *ramburi.* — The differences between these forms are on the whole very minute, which does not mean that the opinions of KIRBY, who distinguishes 3 species, and STAUDINGER, who has 2 in his Cat. of 1871, may not be correct. CHAPMAN was quite right in drawing attention to the fact that in smaller and almost scaleless species the larva, the geographical distribution, time of appearance, food-plant, etc.. are of greater weight as distinguishing characteristics than in the case of normal groups of Lepidoptera, and we refer to the genus *Somabrachys* (cf. p. 335), to which the same applies. In the two forms *paradoxa Hbn.* and *ramburi Kirby* the larger size of the latter, the somewhat different wing-contour and the colour and size of the cocoon, which is smaller and lemon-yellow in *paradoxa* and larger and orange-yellow in *ramburi Kirby* (*paradoxa Ramb.*) are important distinctions. The food-plants are chiefly Cytisus, Genista, Sarothamnus and Blackberry, but the young larvae do not begin to feed on the plants before they have eaten the remnants of the mother in the cocoon. Most of the forms are abundant where they occur and can be obtained in large numbers on sunny days in July, but some forms are said to be scarcer. The ♀♀ partly leave the cocoon at the hour of copulation, but return into it at night or after copulation.

Alphabetical List

of the Palearctic forms of *Heterogynidae* with references to the original descriptions.

* signifies that the species is figured at the place cited.

affinis Het. *Ramb.* Ann. Soc. Ent. Fr. 1836, p. 586.
bejarensis Het. *Chapm.* Trans. Ent. Soc. Lond. 1902, p. 717.
canalensis Het. *Chapm.* Trans. Ent. Soc. Lond. 1901, p. 71.
candelariae Het. *Chapm.* Trans. Ent. Soc. Lond. 1902, p. 717.
paradoxa Het. *Hbn.* Smlg. Eur. Schmett. 2. *
piedrasitae Het. *Chapm.* Trans. Ent. Soc. Lond. 1902, p. 718.
ramburi Het. *Kirby*, Syn. Cat. Lep. Het. 1, p. 499.
uncedinis Het. *Chapm.* Trans. Ent. Soc. Lond. 1907, p. 162.

22. Family: Psychidae.

The family of case-moths comes close to the *Heterogynidae* in the acquired adaptations, but not in its anatomical structure and systematic affinities. Where its proper position in a scheme of classification should be, is the less possible to say, as the family is not homogeneous and the characters on which the systematic position has hitherto been based are for the most part taken from superficial adaptations to a life in cases which have rendered originally differently organised moths similar. Some genera would certainly be best referred to the Micros, if one does not go so far as to separate from the Macros the whole group as being more or less closely related to the Micros, as is also the case with the *Sesiidae*, *Thyrididae* and others.

We follow also here the general use and place the *Psychidae* where they are found in the hand-books, particularly in the excellent Catalogues of W. F. KIRBY and STAUDINGER-REBEL, namely in the neighbourhood of the *Limacodidae* and *Sesiidae*, being separated from them only by small and relatively isolated groups which had to be interpolated.

It follows from what we have just said that the characterisation of the family cannot very well be based on the structure. But the species have many bionomic points in common, and it is also advisable from a practical view-point to base the arrangement on the external adaptations until a detailed anatomical examination enables us to place the various groups of *Psychidae* with those other families with which they are phylogenetically related. Such families are perhaps the *Megalopygidae*, *Limacodidae*, *Tineidae* (resp. *Talaeporidae*) and probably also the *Lithosiidae*, presumably also some others.

The Palearctic *Psychidae* are all small and inconspicuously coloured moths, as are also most of the exotic forms (of which, however, only an insignifant fraction is known). There are no really bright-coloured species at all. The only vividly coloured Psychid is probably *Metura elongata* (*Oiketicus saundersii*) from Australia, whose wings are russet black-brown and reticulate, while the head and thorax are very vivid orange-yellow, the two colours contrasting strongly. Some Bolivian species have entirely vitreous wings, and even in the largest forms the scheme of marking is the simplest imaginable.

The most striking characteristics of the family are the reduction of the ♀♀ and that the larvae live in a protecting case. The exceedingly numerous eggs, of which many hundreds are laid by a ♀, are globular and small, almost equalling coarse sand. They lie in the maternal case embedded in a kind of spun wool and remain undeveloped for months in some species. The young larvae resemble minute Staphylinid beetles. As they are without abdominal legs, their thoracic legs are strongly developed instead, and the young larvae when disperseing raise the abdomen, as do the Staphylinidae when irritated. The young caterpillar has a flat, hard and horny head and the 3 thoracic segments strongly chitinised, the abdomen being soft. Soon after leaving the maternal case it commences to bite off little bits from all kinds of objects and, by uniting them, to build a very primitive protecting case. I used to give the young larvae bits of cork, for which they show a great preference and which they only discard at a later stage in favour of little pieces of leaves, stalks, etc. The structure of the case is usually characteristic for each species. At large it is constructed according to species of bits of leaves, twigs, stalks, moss, lichen, sand, small flints, small shells, etc.; but in captivity all kinds of artificial products are spun into the case, such as cloth, paper and even minute particles of metal. Almost during the whole larval period the caterpillar is occupied with enlarging, repairing or renewing the case. The larva is able to turn in the case freely, and can alter the case in every place as it thinks fit, biting a hole into the case from inside in order to remove a piece of cover which is no longer suitable and to replace it by another object. When rearing hundreds of caterpillars of the large *Oiketicus geyeri*, which I have done for years, I changed sometimes the material mixed with the food-plants and thus obtained cases consisting sometimes more of cork, or particles of leather, sometimes more of bits of newspapers, etc. Sometimes the larvae turned thieves, biting off particles from the cases of others and using them for themselves.

Whatever the characteristic of the case may be in a species, the individuals of this species hardly differ among themselves in their building instinct. With a certain species some material for building may be much preferred, other material altogether rejected, but I was often astonished in noticing how uniform were the cases of the specimens of a species even if the individuals fed on quite different plants. I sometimes removed *Oiketicus*-larvae from their case, and inducing them to crawl into that of another caterpillar they at once set to work to make it comfortable. When after 2 or 3 days I placed their own case before them, they rejected it and remained in the new one.

The cases of the full-fed specimens are very diverse in shape. Some are simple tubes of sand, sometimes wound spirally like a shell. The Australian *Entometa ignobilis Walk.* places parallel on the outside of its case small bits of twigs, some of which stick out at the ends; and Herr Heylaerts, of Breda, was so kind as to send me cases of the African *Eumeta moddermanni Heyl.* which are similarly constructed. On the other hand, the Australian *Thyridopteryx huebneri Westw.* makes cases which are covered with bits of leaves placed in tile-shape one over the other, so that the silky house is entirely concealed. *Oiketicus geyeri* from Buenos Aires and Montevideo fastens small twigs to its silky case, which are transverse, oblique and raised so that an ill-defined mass is formed. *Metura elongata*, from South Australia, on the contrary constructs regular long tubes resembling a cigar in size and shape, on which bits of twigs inches long are placed parallel at rather regular intervals. Herr José Steinbach sent me from Bolivia cases which were quite uniform, appearing as if made of grey paper; they are conical pointed cases, almost mathematically exact, which hang on rocks. A species very abundant on the fields at Biskra is *Amicta quadrangularis*, of which I have found up to 20 cases on one bush of a herb; this larva builds a very regular tetragonal case of pieces of stalks of exactly the same length, which are placed together transversely in a square. Only in very rare instances all materials suitable for covering the cocoon are rejected and — e. g. by the Australian *Thyridopteryx herrichi* — the cases made purely of silk, the long-stalked balloons hanging on the trees like fruit.

Most Psychids are very voracious and not very particular as to their food. Some eat a variety of different plants just as they happen to be handy, and even change from deciduous plants to Conifers. Often dry brown leaves are preferred to the most succulent foliage, and some species appear to eat without distinction any part of a plant from the flower to the almost wooden branch.

The larvae of the Psychids are very mobile and wander considerable distances. Although the caterpillar has only the thoracic legs to walk with — the rest of the body is without feet, thin-skinned and almost as soft as a maggot — they walk fast. Young larvae run nearly as fast as a beetle and the older ones are very adroit climbers. When molested they shrink back and retreat into the case, which they fasten with silk by an exceedingly rapid movement, placing the case over themselves rather than really retreating into it. If one molests them in the case, they use their mouth and fore legs with much power to close the aperture. If they are attacked on the trees they go down to near the ground with great rapidity on a silk-thread. In the tree-shaded streets of Montevideo one notices everywhere in February the cases of *Oiketicus* as large as a thumb hanging down from the branches on long threads, and it is there sport for the street-children to collect them and to throw these innocent weapons at each other as do our boys in the winter with snowballs.

When the time for pupation approaches, the case is fastened with tough silk on a base at hand. The ♀-cases, which are distinguished in many species from the ♂-cases by the more compact build, are usually placed higher, more exposed and more easily accessible to the ♂, the more slightly constructed ♂-case is more concealed among the vegetation and hence often nearer the ground, e. g. in *Pachytelia minor*. The ♂-moths emerge at a regular hour and usually soon begin to fly, some at night, many by day. The more delicate species flutter weakly from stalk to stalk, the large *Oiketicus* race wildly in great jumps over the fields and prairies. Sometimes a gale surprises them, and after such a "Pampeiro" which sweeps over the Llanos and Pampas of South America the swamps and puddles are covered with the moths, where the gale has thrown them, in company of masses of the ♂ of *Hypopta ambigua Hbn.*, which fall victims to the same force.

Those ♂♂ which escape the not too rare enemies soon find the ♀♀ with the help of the organs of scent. The ♀♀ do not leave the case. While the ♂-pupae are pushed out of the posterior aperture of the case for half their length, the moths escaping and the empty pupal shell remaining in the aperture of the case, the ♀-larva does not turn round for pupation, the head of the chrysalis remaining directed towards the tightly closed mouth of the case. When the ♀ is ready for emerging the anal part of the pupal case splits, whereby the genital aperture of the ♀ becomes uncovered. The ♂ settles on the cocoon and pushes its abdomen into the case copulation thus taking place. In order to enable the ♂ to get a good foothold the ♀-case is provided in some species with a special arrangement for that purpose, the above-mentioned projecting pieces of wood or leaves of some cases, e. g. in *Eumeta moddermanni* and *ignobilis*, are said to serve that purpose.

In spite of the apparently very good cover the larvae of *Psychidae* are attacked by various kinds of enemies. The Ichneumonidae know very well how to infest them, and many a carniverous enemy goes for them in their cases. They are very mobile within the case and when much molested may be induced to leave it altogether, but then the fat soft larvae are quite unprotected and play a poor rôle. I have often driven such larvae from their covering, left them helpless on the ground for several hours, and then gave them their cases back; some bore the experiment well, but the majority died if left exposed for some length of time, and it was evident that the large and almost full-fed *Oiketicus* were hardly or not at all able to spin quickly another case.

The moths, as is self-evident from their atrophied mouth-parts, do not feed at all and have therefore a very short life. The ♂♂ soon die after copulation. The ♀♀, which hardly lead the life of a Lepidopteron in the ordinary sense, commence to oviposite soon after copulation. It appears that fertilisation is effected by the sperm soaking into the lump of eggs of which the greater part of the ♀-body consists rather than by impregnating each egg singly. In some cases parthenogenesis has undoubtedly been established, the occurrence of which is evident from the fact that the ♂♂ do not occur everywhere or not in every brood. But it has also been suggested — though by no means proved — that parthenogenesis occasionally occurs also in other species which normally are bisexual. The single experiment I made in this respect had negative results. In Buenos Aires I collected 6 female cases each producing hundreds of larvae. About 100 ♀-cocoons obtained from them I separated from the ♂-cocoons, but although they certainly contained 20—30 000 eggs I did not get a single larva. This appears to prove that parthenogenesis does not occur in some species or only as an exception.

About 200 Psychids are now known, of which Kirby enumerated in his Catalogue 193. The figure does not give us a correct idea of the number actually existing. One does not frequently meet with these often inconspicuous moths, as their time of appearance and the localities where they occur are often very restricted and rearing of the larvae is difficult on account of the often slow growth. The great incompleteness of our knowledge of the *Psychidae* is best proved by the fact that more species are known from Ceylon, where Psychidae have been specially collected, than from the whole rest of British India. About 100 forms are known from Europe, which is well-explored, and not even a dozen are described from the large Ethiopean Region. It follows that many *Psychidae* are known everywhere they have been well-collected and bred, and only in places where this has been the case.

If a general survey of the distribution of *Psychidae* shows us that these insects are exceptionally widely distributed, occurring all over the globe from New Zealand to Ireland and from Cape Horn to Kamtschatka, and are even represented on remote groups of islands, such as the Canaries, it is difficult at first sight to understand how that is possible, considering the ♀♀ are not only wing-less but also abutely without the faculty of locomotion. However, the enigma explains itself if we consider the following facts.

First of all, the *Psychidae* are not monophyletic, i. e. are not branches of one and the same stem, so that the forms existing to-day in Tasmania may very well be derived from quite a different branch of Lepidoptera than, e. g., the species inhabiting Sweden. Further the larva possesses quite exceptional means of dispersal. Being protected by its case it wanders about and penetrates into every nook and corner where vegetation is to be found. The case is waterproof, so that the insects can even exist where the waves of the sea reach them. At the rocks in Botany-Bay in Australia I found directly above the surging surface of the sea finger-long cases of Psychids which were splashed with foam and water by each wave, and when I opened them I found live and evidently healthy larvae. With this power of endurance it must be possible for the larvae which come into the water with floating wood also to cross the seas and thus to reach by and by new islands and continents. It is very likely that, as in our genus *Apterona*, there are also exotic forms which become parthenogenetic perhaps under certain difficulties of existence, and in such instances the introduction of a single ♀-case with the enormous number of eggs contained in the body of the ♀ would be sufficient to establish the species successfully in a new country. Even a larva would be sufficient, as a branch of a tree floating in the ocean would provide sufficient food in its bark and covering of lichens for many species of Psychids — which are usually very polyphagous and also subsist on dead vegetable matter — on a voyage of weeks' or months' duration. During one of the frightful gales in which I was caught on the Pampas of Uruguay in a place without any woods branches of trees fell to the ground which the wind had carried for miles over the plains. On examining the branches in order to find out from the species of tree the place of its origin, I discovered Psychid cases containing young larvae. These little caterpillars were unharmed and at once attacked the food. Moreover, no larvae known to me endure actual hunger so well as those of the Psychids, be it that they can really exist for weeks without food and moisture, be it that the dry bits covering the case prevent them from dying. Once I had collected on a desert herb in North Africa larvae of *Amicta quadrangularis* and had them so packed away in my luggage that I could only reach them and take care of them after many days of absolute starvation. But they were none the worse for it and I reared them without difficulty on the peal of apricots. As this power of resistance to adverse circumstances is coupled moreover with a certain indifference to temperature, the distribution over the whole globe is understandable.

a. Subfamily: **Oeceticinae.**

In the forewing veins 1 c and 1 b anastomose, the latter sending more than one branch to the hind margin, 1 a and 1 b separate at the base, then coincident. The cell of both wings divided by a longitudinal vein forked at the end. Fore tibia usually with a long thorn.

1. Genus: **Amatissa** *Walk.*

Forewing with 12 veins, 1 b sending two spurs to hind margin, 4 and 5 short-stalked or from a point, 8 and 9 stalked, cell-vein forked, the lower branch of fork sending a spur to median nervure; in the hindwing 6 absent, and 7 connected with 8 by a bar. Fore tibia unarmed, terminal segment of the tarsi long.

consorta. **A. consorta** *Templ.* (= inornata *Walk.*) (56 g). ♂ dark brown, abdomen with yellow and brown markings. Expanse 28 mm. Larva-case covered with minute fragments of vegetable matter, the free end strongly pointed. — On the wing in May—June in Japan (Yoshimo, Yamato, Hondo); also known from Ceylon and Borneo.

2. Genus: **Clania** *Walk.*

Antenna pectinated to tip, but the branches gradually decrease in length from the first third. Forewing rather pointed, with oblique distal margin, veins 4 and 5 and again 8 and 9 stalked, all the 12 veins present; in the hindwing two branches from 8 to costal margin. Terminal segment of fore tarsus long. Fore tibia with a long spine. The abdomen considerably projects beyond anal angle of hindwing.

pryeri **C. pryeri** *Leech*, from Shanghai, appears to me to be a doubtful species. The original description consists of 4 lines, the species being compared with "*Eumeta wardii* from South India", which has not even been published (sic!) (probably *Eumeta layardii* was meant). According to Hampson (1892) *pryeri* as well as *layardii* are synonyms of *Clania variegata Snell.* from Celebes; but, to judge from the original descriptions, the forms can hardly be identical. If the above-mentioned "*Eumeta wardii*" was a laps. cal. for *Eumeta layardii*, we may assume that *pryeri* is different from *layardii*. — The forewing of *C. pryeri* are said to be broader than in "*Eumeta wardii*", the apex of the hindwing less prominent, the colouring more uniformly dark coppery brown than "in the other species of *Eumeta*" (in *layardii* bears the forewing two rather distinct pale longitudinal bands). Expanse 28.5 mm.

japonica. **C. japonica** *Heyl.* ♂ dark brown, costal margin of forewing paler, fringes brown at their bases, yellowish at their apices. Antenna with 36 segments. Larva-case long, pear-shaped, covered with small twigs and leaves. — Tokio.

minuscula. **C. minuscula** *Butl.* (56 g). Smoky brown, with a rosy suffusion, veins of forewing blackish; body darker than the wings. Expanse about 23 mm. — Yokohama; Central China.

b. Subfamily: **Psychinae.**

♂ with one pair of very short spurs to the hind tibia, hind leg shorter than the fore leg; in the forewing veins 1 a and 1 b separate at the base, then anastomosing for a short distance, sending a single branch to the hind margin, and the other to the distal margin; in the hindwing vein 7 connected by a bar with 8.

3. Genus: **Acanthopsyche** *Heyl.*

♂: forewing with 11 veins, hindwing with 7. In the forewing 1 c terminates in the distal branch of 1 b, 8 and 9 stalked, 6 absent. In the hindwing 6 also absent, 7 connected with 8 by a bar; 4 and 5 of both wings either stalked or separately from cell. Antenna bipectinated to the tip, the shaft as well as the pectinations hairy beneath, the former scaled above, the latter not scaled above and gradually decreasing in length from middle to apex. Legs long and slender, femora with long hair, fore tibia armed with a very long spine, hind tibia without spurs. ♀ vermiform, with projecting head, small dots as vestigial antennae, black eye-spots and dilated anal segment. Mid and hind legs vestigial, mid leg with a claw-like bristle, nota of thorax black and polished, anal segment with fleshy processes. — The larva (cf. *A. atra*) with narrow head, the body broadest at segments 3 and 4, the intersegmental incisions distinct, anal segment with horny plate, abdominal legs with distinct central impression, the thoracical legs short and strong, the third pair the largest.

atra. **A. atra** *L.* (= opacella *H.-Schäff.*, furva *Kirby* nec *Borkh*, fenella *Neum.*) (55 a). ♂: The wings semitransparent, blackish brown with darker veins, towards distal margin with upper scales. Abdomen with moderately long hair. Antenna with 29 segments, 4.3 mm long, the first segment very long, the second large and globular. ♀ 10 mm. long, 3 mm broad, white, vermiform, a small black chitinous dorsal plate on the first abdominal segment: the hair at once wears off. Distributed throughout Europe from Finmark to the Mediterranean, and from England to Asia Minor and Transcaucasia. On the wing end of April and May. *senex.* — senex *Stgr.*, from Bulgaria and Armenia, has the antennae thicker, the thorax and abdomen whiter and the scaling thinner. Has later also been recorded from Roumania and Tiflis, and is perhaps a distinct species. — The larva of the main form is dirty yellow, with blackish dorsum; the thoracical plates spotted with deep black and yellow. Annual or (according to observations in England) biennial, on Calluna, Vaccinium, Salix, Gramineae, etc. The larva case dark in colour, moderately stout, not very regularly covered with sand and vegetable fragments, up to 20 mm. long, in ♂ with a silk-tube 5 mm. long.

zelleri. **A. zelleri** *Mén.* (= zelleriella *Brd.*) (55 a). Differs from *A. atra* in its smaller size (length of forewing 6.5 mm), shorter antenna, and shorter, rounder, more densely scaled wings; in *atra* the antenna is two-thirds and in *zelleri* hardly half the length of the forewing. ♀ reddish yellow, with polished black-brown head and neck. — The larva very similar to that of *atra*, feeds on grasses; larva-case shorter and slenderer. Found in Hungary, Croatia, Dalmatia, and perhaps France.

inquinata. **A. inquinata** *Led.* (55 a), from Beirut in Syria, is dirty brown in the ♂, the scaling of the wings somewhat denser and more greyish felty than in the two previous species. The hindwing is said to have 8 veins, 4 and 5 stalked, and the forewing as in true *Acanthopsyche* only 11 veins, of which 6 and 7 are stalked. It is therefore not quite certain if the species belongs to the present genus. ♀ and larva-case not known.

nigriplaga. **A. nigriplaga** *Wilem.* (56 g), from Japan, is closely allied to the Indian *A. bipars Walk.*, but the veins are more distinct and the black marking in the basal area of the hindwing more extended, but more restricted in the forewing. Expanse 18—28 mm. Said to occur also in China (Cherra) and India (Sikkim), and has perhaps sometimes been confounded with *A. bipars Walk.*

himalayana. **A. himalayana** *Moore*, from Kashmir, belongs to the subgenus *Dasaratha Moore*, in which vein 6 is present in the forewing and the cell-vein forked in both wings. ♂ almost uniformly dark brown, head and thorax darkest in tint. In the forewing veins 7, 8 and 9 stalked, 4 and 5 from the cell in both wings. 18 mm. — Dharmsala; only at the boundary of our Region.

4. Genus: **Chalipecten** *gen. nov.*

The author of the two species placed them into *Chalia Moore*; but the type of the new genus, *C. staudingeri Heyl.* differs very essentially from the genotype of *Chalia*, *Ch. doubledayi Westw.*: Forewing with only 11 veins, 4 and 5 from a point, the missing vein being probably 7, and 8 and 9 stalked, the apex of wing between these two; in *Chalia* the forewing has 12 veins, 4 and 5 stalked, 7 also stalked with 8 and 9, 8 terminating in the apex of the wing. Veins 1 b and 1 c anastomose as in *Chalia*, but send a branch to the hind margin as in *Acanthopsyche*; it must be left undecided if 1 b is forked at the base. The discocellular of the forewing is divided by the single cell-vein into two even halves which have the same direction, while in *Chalia* the anterior portion is longer and extends more distad. Hindwing with 7 veins (6 absent), none of them stalked, 8 connected with cell by a long oblique bar and forked at the base; the cell-vein curved. Differs further from *Chalia* in the pectinations of the ♂-antenna being very long, measuring more than one-fourth the length of the shaft and only decrease in size from the apical third. Forewing elongate, with the apex broadly rounded, and the hind and distal margins joined in an even curve, width at the broadest point less than half the length; costal margin almost straight. Fore tibia with a very long spine. Abdomen not reaching beyond hindwing.

staudingeri. **Ch. staudingeri** *Heyl.* (55 a). ♂: Both wings greyish black, the hairs and scaling of the same colour, costal and distal margins deeper black, fringes brownish. Antenna with 30 segments, the shaft yellow and the pectinations brownish black. Legs strongly hairy, excepting the tarsi, which are naked, greyish yellow and above spotted with brown. Expanse 19 mm. ♀ and larva not known. — Russian Turkestan.

puengeleri. **Ch. puengeleri** *Heyl.* ♂: Black-brown, hair the same colour on head, but black on thorax and abdomen. Legs exteriorly black-brown, but with yellow hair interiorly. Antenna brown-yellow, with 20 segments. Palpi blackish. Wings unicolorous, above black-brown, beneath brownish yellow with blackish veins. Veins 8 and 9 (according to HEYLAERTS counting 7 and 8) on a long stalk. Expanse 18 mm. Pupa of ♂ glossy yellow; larva-case elongate, 15 mm. long, cylindrical, almost pyriform, irregularly covered lengthways with fragments of wood and leaves. — Nikko, Japan.

5. Genus: **Pachythelia** *Westw.*

♂: forewing with 11 veins, hindwing with 7. In forewing vein 1 c absent or only vestigial, 1 a and 1 b forming a long fork in the basal third of the wing, 1 b sending a simple, very oblique branch to the hind margin which it does not reach and is distinctly incurved in its distal half or almost angulate in centre; 4 and 5 from a point or on a very short or even very narrowly separated, 6 absent, 7 distinctly separate from 8 and terminating in the margin far below the apex of wing, 8 and 9 on a very short stalk, 8 terminating in the wing-apex, 10 and 11 parallel from apical third of cell, 10 being but little farther from 11 than from 9; cell symmetrical at apex, the cell-vein from the centre of the discocellular. In the hindwing 4 and 5 on a short stalk, 6 absent, 7 connected with 8 by an oblique bar. Antenna not long, bipectinated to the tip, but the distal branches short, shaft with 32 segments (*villosella*), scaled above.

pectinations not scaled. Legs of moderate lengths, with long hair. Fore tibia with long spine; hind tibia unarmed. ♀ vermiform, very robust, with atrophied limbs, but eye-spots and small antennal tubercles present. Thoracical segments with dark dorsal plates, abdominal segment 10 modified into a small ovipositor. Larva with small, rounded, hairy head, the segments of anterior half of abdomen broadest, thoracical plates horny, with paler lines, anal segment chitinous. Larva-case irregularly covered with strong material, the particles only being fastened to the central silky case with one end.

villosella. **P. villosella** *O.* (= grandiella *Bdv.*, viciella *Hbn.*, magniferella *Brd.*, hieracii *Kirby*) (55 a). ♂ blackish to reddish grey, the discocellular prominent as a black bar in both wings, fringes and costal margin darker than the surface of the wings. Body with long hair. Expanse 27—28 mm. The ♀ yellowish white with brown dorsal plates to the thorax and a similar but smaller plate on first abdominal segment; antenna with 2 segments; head with numerous thin bristles. The species is on the wing in June and July, being known from Central Europe, Southern Scandinavia and Finland, St. Petersbourg, Northern Italy, Southern France, Dalmatia, Southern Russia, Asia Minor, Turkestan and Armenia. — *nigricans.* **nigricans** *Curt.* (= nigricantella *Brd.*), from England, is, according to Bruand, always a little larger than continental specimens, and the discocellular of the hindwing is more vertical (instead of being strongly oblique as in the name-typical form) and divided by the cell-vein into two even halves which have exactly the same direction. The distinctness of this form as a variety appears to be very doubtful. — *hirtella.* **hirtella** *Ev.* (= casanella *Brd.*) is also a questionable form, differing from true *villosella* according to Bruand in small details of the neuration, whereas according to Heylaerts *hirtella* is based on large specimens which do not otherwise differ from *villosella*. Kasan. — *cinerella.* **cinerella** *Dup.* is said to have the forewing a little narrower and the antenna shorter; the colouring is less brown and more ashy grey than in the main form, the neuration is also said to differ slightly. France. — All these secondary form have been mentioned by Tutt (1900), who however also says that the distinctions on which they are based are but doubtfully established. — Larva dirty brownish with darker dorsum and black-brown thoracical plates, which bear a whitish yellow median stripe and broad lateral ones of the same colour. It feeds usually for 2 years on Calluna, Salix, Birch, Polygonum, Myrica and other plants. The ♂-case is very roughly covered with dry leaves and twigs, the ♀-case beas a very strong covering of stalks of grass and bits of twigs placed longitudinally and being raised.

6. Genus: **Canephora** *Hbn.*

♂. Closely related to *Pachythelia* and united with it by most authors, but it differs at first glance by the entire wings being rather densely scaled, while they are only partially scaled in *Pachythelia* and therefore semitransparent. Moreover, the wings are broader, the distal margin of the forewing is almost straight and but slightly oblique, forming almost a right angle with the hind margin, whereas in *Pachythelia* the wings are more elongate, the distal margin of the forewing more oblique and convex, the hind angle being broadly rounded. Fringes shorter. There are no essential differences in the neuration; 4 and 5 of forewing separate, though close together, stalk of 8 and 9 as long as or a little shorter than the free branches, 10 much farther away from 11 than from 9; in the hindwing 4 and 5 close together but separate. Legs and body with the hair less long, the body less robust. The ♀ has distinct vestiges of eyes, antennae and legs, being altogether less reduced than the ♀ of *Pachythelia*.

unicolor. **C. unicolor** *Hufn.* (= graminella *Schiff.*, paleiferella *Brd.*) (55 a). ♂ sooty black, very large for a Palearctic Psychid, expanse 26 mm, the distal half of the fringes whitish, hair of body blackish grey, beneath considerably paler and with a silky gloss, antenna pale greyish. ♀ brownish white with dark thoracical plates and a similar but smaller one on dorsum of first abdominal segment. — Larva yellowish to grey-brown, with dark anal plate and black head; the thoracical plates yellowish with black double stripes and a black lateral stripe. The case of the ♂-larva bears a very long dirty white tube and is covered with dry leaves; the ♀-case is for one half rough with raised dry bits of grass. The larva is annual and feeds on grass. — In Central Europe with the exception of England, in Southern Scandinavia, northern districts of South Europe, Armenia, Ussuri districts; however, it is doubtful whether it occurs in Eastern Asia together with the next species.

asiatica. **C. asiatica** *Stgr.* (55 a) is smaller (19—23 mm) and less deep black than *unicolor*, the forewing semitransparent greyish black, palest distally; the fringes somewhat paler, especially beneath. — The larva-cases are said to be very different from those of *unicolor*, bearing a less abundant covering, and strongly to resemble the cases of *Acanthopsyche atra*. — Central Asia, China (Fu-chou), Japan.

7. Genus: **Amicta** *Heyl.*

♂: Antenna as in *Pachythelia* bipectinate to the tip, the shaft non-scaled. Venation as in *Pachythelia*, but vein 1c of forewing, if at all present, runs free into the distal margin, and the stalk of 8, 9 is very short, at least much shorter than the free ends of these veins. Wings sparsely clothed with scale-hair and therefore semitransparent, the distal margin of the forewing oblique, the hind angle broadly rounded. Legs shaggy, fore tibia with spine, hind tibia without spurs. ♀ and larva very similar to those of *Canephora* and *Pachythelia*.

quadrangularis. **A. quadrangularis** *Christ.* is large (expanse 24—28 mm); the wings whitish, semitransparent, more or less dusted with grey, with the costal margin darker. Fringes of both wings blackish. Hair of body long, dense and white. Abdomen extending far beyond the anal angle, black, the hair being partly white. Forewing elongate, with rounded apex. ♀ naked, black, only woolly at the anus, this wool being white, length 14—18 mm. The case 35—40 mm long, composed of almost parallel, transversely placed bits of stalks which are so regularly arranged in a quadrangular shape that the four corners are almost mathematically exact right angles. Each side measures about 8—9 mm in width, the ♂-case tapering but little, the ♀-case considerably more. On the inside the case is lined with white silk, and the four cornes split open when the ♂ emerges. The dirty yellowish white larva is 30 mm long, feeds on Alhagi, Artemisia, and Peganum, and bears markings and is coloured on the posterior segments as well as the anterior ones. Pupa of ♂ dark brown, of ♀ slightly paler. The species inhabits steppes, flies in August and September, and is recorded from Egypt and Algeria. The Egyptian form (= *murina Klug*) however, is perhaps constantly different from the main form. The Berlin Museum contains a number of larval cases labelled as follows: everywhere near Biskra on small thornbushes, chiefly Zizyphus lotis, in February. Other cases from the same place bear the remark: „The Psychid cocoons are constructed of stalks of Pithyranthus scoparia C. D., Thymelaea microphylla C. D., Antirrhinum ramosissimum C. D., etc.“ (G. Schweinfurth). — Staudinger has described from Ordubad in South-Eastern Transcaucasia as **nigrescens** (55 a) a form with blackish, semitransparent wings and black abdomen. — From Palestina a pale whitish grey form, **albescens** *Stgr.* (55 b), has been recorded, in which only the costal margin of the forewing remains dark; size larger, expanse 32 mm. — **murina** *Klug.* Only 1 specimen before me, Klug's type; as far as can be judged from this old example (which, however, is rather well preserved), *murina* differs from the original description of "*Psyche quadrangularis Christ.*" in the following points: The body is not black, but pale brownish; the scaling at the costal margin of both wings brown, not black, the forewing less elongate resp. its distal margin much less oblique, the wing therefore appearing broader at the apex; also the hindwing broadly rounded at the apex and broader than the forewing. The wings are also broader at the apex with less oblique distal margin than in *Hyalina albida Esp.*, whereas *quadrangularis* differs from *albida* inter alia in the "more elongate wings". The hair of the whole body is dirty yellowish white, only being somewhat darker in the face. The fringes brown grey on the forewing and brownish yellow on the hindwing. Veins without darker scaling. The anterior portion of the body, also apart from the hair, is almost twice the width of the abdomen, which latter extends but little beyond the hindwing. Veins 4 and 5 of forewing on a long stalk, but the stalk shorter than the free ends. Moreover, the legs are not black. Expanse 27 mm., length of forewing 12—13 mm, length of antenna 7 mm.

nigrescens. albescens. murina.

cabrerai. **A. cabrerai** *Rebel* (55 b), from the Canaries, is sooty brown in the ♂; the antenna reach to one-third of the costal margin and have about 25 distinct segments, the branches being strong and, towards their apices, incrassate. Body and legs covered with smooky brown woolly hair. The spurs of the hind tibia are small. The abdomen does not extend beyond the anal angle of hindwing. The fringes have a feeble reddish brown flush. Length of forewing 5.8—7.2 mm. — Larva in the spring on Euphorbia. The cases on Tamarix canariensis, in facies like those of *quadrangularis*, up to 12 mm long and 3 mm broad. The pupa of the ♂ 6 mm long. Moth in August—September.

sera. **A. sera** *Wisk.* (55 b) (= heylaertsi *Mill.*). The ♂ resembles *lutea*, but is smaller and darker, with more rounded wings and slenderer antenna. Length of forewing 10—11 mm. ♀ clothed with a whitish wool. — In the mountains of Central Italy and Sicily, in August. — The larva biennial, until July; head and nuchal plate brown with black punctures, the dorsal plates of meso- and metathorax divided by a light median stripe and laterally spotted with yellow. The larva-case is 25 mm long, brown, irregularly covered with bits of leaves and stalks.

tedaldii. **A. tedaldii** *Heyl.* (55 b). ♂ yellowish smoky brown, densely hairy, abdomen not extending beyond anal angle of hindwing. Forewing densely scaled, elongate, 11 mm long. Hindwing shorter and more rounded. — The larva-case elongate, tapering towards the apex, covered with leaves and shells. ♀ not described. Both sexes emerged (Algerian specimens) the end of August (according to Oberthür). This form, which is perhaps not specifically distinct from *sera*, is recorded from Sicily, Algeria, and Syria.

lutea. **A. lutea** *Stgr.* (55 b). ♂ uniformly yellowish grey. The pectinations of the antenna gradually decrease in length. Abdomen strongly pointed. Length of forewing 11—12 mm. July—August. Italy and Sicily, Greece, Western Asia, and Algeria. Larva 20 mm long, dirty yellow, head and thoracical plate light yellow with black markings. The larva-case as in *febretta*, but the stalks of grass are irregularly arranged. — **armena** *Heyl.*, from Armenia, is darker, but has whitish pseudopalpi and stronger antenna; the tibial claw reaches to the middle of the first tarsal segment, while it is not longer than the tibia in true *lutea* as well as in *shahkuhensis*. — **shahkuhensis** *Heyl.* is still darker than *armena*, and also stronger in build; the branches of the antenna much longer, the hair of the body long, the fringes brownish. In North-Eastern Persia.

armena. shahkuhensis.

febretta. **A. febretta** *Boyer* (= vetulella *Ramb.*, ? magnella *Bdv.*, ? maritimella *Brd.*) (55 b) is for the greater part brownish to blackish in ♂; the black colour most distinct in the basal half of the wings and on the body. Antenna long, with light brownish pectinations. The hair of the body blackish to grey, the face being light grey. Wings elongate, with pointed apex, the abdomen also pointed, far extending beyond the anal angle. Fringes short, white at the end of the wings. Length of forewing 10—11 mm. Flies in August in Southern Europe (excepting Greece) and Asia Minor. — *albipunctella.* **albipunctella** *Mill.* has a white central spot on the forewing and occurs everywhere among the main form, whereas *lambessa.* **lambessa** *Heyl.*, from Algeria, is probably a local race; the latter is less robust than true *febretta* and has only 7 veins in the hindwing. — Larva with black head and black thoracical plates with 2—3 yellowish white longitudinal stripes; biennial, feeding until July on Genista, etc. ♀ yellowish with dark head and reduced legs. The case is covered with rather thick stalks of grass arranged longitudinally and raised, the anterior end incrassate, the silky tube of the ♂-case short.

ecksteini. **A. ecksteini** *Led.* (55 b). Distinguished from the preceding species inter alia by the obtuser apex of the forewing; this wing semitransparent, with blackish scaling, dark transverse discocellular spot, and dark fringes with brownish gloss. Body black with silky grey hair. The antenna with long pectinations almost to the tip. Length of forewing 9—10 mm. ♀ with light brown head. — Larva dark, with the head and thoracical plates black-brown, the latter with a median stripe and two lateral ones yellow. Case covered with dry stalks of grass parallel and longitudinal and frequently very long. These stalks much closer together in ♀ and reaching beyond the ends of the case, while in the ♂-case the long apical tube is not covered. — Hungary, Bulgaria, Turcmenia; flies in April. In the Berlin Museum a mounted ♀ from the former coll. Rosenhauer labelled "*Psyche ecksteini*" with the locality "Germania".

grummi. **A. grummi** *Heyl.*, from Ferghana in Central Asia, has the forewing broadly rounded, semitransparent, covered with brownish yellow scaling, the veins being brown and a marginal line dark. Body with long yellowish white hair; abdomen thin and reaching far beyond anal angle. Legs brownish yellow, the hind femur blackened. Antenna grey with darker pectinations, 34 segments. Expanse 17—18 mm. ♀ dirty yellow, 10 mm. long and 1½—3 mm broad. The ♀-pupa chestnut-brown. The case cylindrical, 25 mm long, covered with fragments of plants arranged longitudinally.

uralensis. **A. uralensis** *Frr.* (56 g), from the Ural Mts. and Southern Russia, has in the ♂ rounded, bluish grey wings, the margin being darker and the fringes having a yellowish gloss. Abdomen short and slender, and the antenna short. Hair of thorax long and whitish above and brownish beneath. Length of forewing 9 mm. — *demissa.* **demissa** *Led.*, from East Rumelia and Greece, is larger (length of forewing 10 mm), more brownish; the forewing broader with more strongly curved costal margin. — The case of *demissa*-♀ is 22 mm long, covered with fragments of wood and leaves and strongly broadened in the centre, while the ♂-case is of more even width, covered with sand and usually with a larger piece of a twig only at the anterior end.

jordana. **A. jordana** *Stgr.* (55 c), from Palestine, has darker and less transparent wings than *ecksteini*, being blackish grey with the costal margin of the forewing narrowly black. Expanse 20—22 mm. Veins 4 and 5 stalked in fore- and hindwing. The long-pectinated antenna are longer than in *ecksteini*, and the eyes much larger. Hair of body long and brownish grey.

oberthueri. **A. oberthueri** *Heyl.* ♂ black-grey, densely hairy, head with silvery grey hair, antenna consisting of 38 segments. Thorax anteriorly yellow, posteriorly brownish grey, abdomen brown above, yellowish grey beneath; the rather short forewing almost smoke-colour, rounded at the end, with 12 veins. Distal margin of hindwing slightly concave in centre, the apex rounded, but the anal angle distinct. Expanse 17 mm. ♂-pupa ochreous; case elongate, subcylindrical, covered with rather long, diverging stalks of grass arranged longitudinally. — Oran and Sebdou.

8. Genus: **Hyalina** *Ramb.*

♂. Forewing subtriangular, with only 9—10 veins, hindwing with only 5. Antenna bipectinate to the tip, the branches with long and dense cilia. Fore tibia without claw. Wings vitreous. Rather robust moths. One moult before pupal stage (as in *Scioptera* and *Oreopsyche*). ♀ as in *Amicta*. — The covering of the cases variable within the same species.

albida. **H. albida** *Esp.* (= vitrella *Hbn.*, albivitrella *Brd.*) (55 c). Body black, with white hair. Abdomen extending beyond anal angle of hindwing. Wings vitreous, with the veins and a marginal line but little darker. Forewing 8—10 mm long. ♀ yellowish white. Flies in April and May in Southern and Central France (before me from Lyons). — *lorquiniella.* **lorquiniella** *Brd.* (= albidella *Ramb.*, milleriella *Boisd.*) (55 d), from Spain and South-Eastern France, is darker, and its case is not covered with moss as in *albida*, but with fragments of a species of Ulex. — *plumosella.* **plumosella** *Brd.* (55 c), from Spain, has the abdomen covered with blackish hair; flies the end of March or early in April, and occurs likewise at Lyons (ex. in Mus. Berlin) and Besançon. — Larva whitish, thoracical plates yellowish white with dark stripes; on grasses until spring. The case of true *albida* covered with fragments of moss, which remain green.

H. wockei *Standf.* (55 c). ♂ differs from that of the previous species in its lesser size, more robust body and more rounded wings, which are only whitish at the base, being dark grey distally. Length of forewing 8 mm. ♀ above honey-brown, head and thorax light wax-yellow. — Larva with blackish thoracical plates. Case very slender, asymmetrically covered with fragments of wood. — Flies in April and May in Central Italy (Rome, etc.). *wockei.*

H. lucasi *Trautm.* (55 c), from Algeria, differs from *wockei* in being somewhat smaller, the thorax without any white hair, the fringes somewhat longer, the bases of the wings more pronounced yellow, the antenna longer (almost reaching to the discocellular), the pectinations somewhat longer and more densely ciliated, the hair of the abdomen longer, and in the larva-case being covered with thin broad leaves of grass and otherwise similar to that of *Oreopsyche kahri Led.* *lucasi.*

H. malvinella *Mill.* (55 c). The forewing is only 6—7 mm long and differs, moreover, from that of the two preceding species in being distally more rounded. Wings white, distal margins and fringes brownish with the exception of the anal angle of the hindwing, which bears long white fringes. ♀ whitish yellow, brown anteriorly. The ♂ flies in the afternoon, January—March, in Andalusia. The case is covered with grains of sand and bears single dry vegetable fragments; it is slender, 7—9 mm long, and found on low herbage in Pine-woods. — **abencerragella** *Mill.*, from Castilia, is still darker, being blackish. *malvinella.* *abencerragella*

9. Genus: **Oreopsyche** *Speier.*

Very closely related to the last genus, but the wings more elongate, more abundantly scaled and dark in colour. The larva-cases are very different in the different species.

O. vesubiella *Mill.* (55 c), from Southern France (questionably also from Switzerland), is a large species, forewing 12 mm long, with the wings very elongate and smoky grey, and the antenna long and strongly plumose. The abdomen is characterised by the long hair being parted, and extends only a little beyond the anal angle of the hindwing (cf. *O. biroi Rebel*). ♀ pale yellow, thickest in centre. — Larva wine-red, head white, thoracical segments white with black streaks. The case widened in middle, transversely covered with grass-halms and outside them with a thin white web. *vesubiella.*

O. pyrenaella *H.-Schäff.* (= tabanella *Brd.*) (55 e), from the Pyrenees, resembles the previous species, but is smaller, the forewing measuring 8 mm in length; the entirely transparent and strongly glossy wings are strongly rounded, the costal margin and fringes of the forewing being black and its veins brown. Antenna brown-black; hair of body black or brown-black. ♀ not known. — Larva polyphagous; on Juniperus communis, Calluna vulgaris and particularly Vaccinium uliginosum and myrtillum. The ♂-case is almost cylindrical before pupation, later globular, and irregularly covered with small fragments of stalks. — **albescens** *Oberth.*, from the Central Pyrenees, is larger, the wings have a milky white tone and shorter fringes, which are grey instead of black. *pyrenaella.* *albescens.*

O. tabanivicinella *Brd.* (55 c) is larger (length of forewing 9 mm) with the wings more pointed than in *pyrenaella*. The wings have a reddish brown tone and black fringes. The brown-black antenna is relatively short. Body with dark brown hair, but the hairs paler at the tips. — Larva wax-yellow, with black-brown head, the thoracical plates likewise black-brown, with yellow markings. It is polyphagous, but feeds particularly on *Carlina acaulis*, is full-grown the end of September, but pupates only the next spring; on the wing the end of May and in June. The case is 22—24 mm long, cylindrical, slightly rounded-incrassate at both ends, similar to that of *pyrenaella*, but covered with shorter and less raised vegetable fragments. — Southern France. *tabanivicinella.*

O. biroi *Rebel*, from Croatia, is closely related to *vesubiella*, but the antenna and its pectinations are longer, the upper angle of the cell of the forewing is less pointed and does not project so far beyond the lower angle, its distance from the wing-apex equalling about one-third the length of the wing, while the distance is only one-fourth the wing in *vesubiella*. Moreover, veins 6 and 7 (and 8) of the forewing branch off separately, while they originate from a point in *vesubiella*. In the hindwing the upper discocellular is vertical to the costal margin, in *vesubiella* however directed obliquely forward and outward. Forewing 10 mm long. On the wing at the end of June. — Differs from *O. leschenaulti* in its larger size and longer pectinations. *biroi.*

O. kahri *Led.* (55 c). ♂: Forewing with the distal margin strongly oblique and convex and about as long as the hind margin; the hindwing narrower, evenly covered with blackish scaling; both wings somewhat paler at the base. Head and body very shaggy black-brown, the frons with grey hair; the hair at the apex of the abdomen projects in the shape of two divergent thick tufts directed backwards. Antenna very plumose, with irregularly arranged, very strong pectinations. Length of forewing 7—8 mm long. ♀ and larva not known. — Case 12 mm long, irregularly covered lengthways with broad fragments of stalks. — Calabria and Sicily. *kahri.*

O. leschenaulti *Stgr.* (55 e). ♂ closely resembling *O. kahri*, but paler, more delicate, and less shaggy. The hyaline wings milky white with grey and rather short fringes. Body black, but the hair white. The *leschenaulti.*

pectinations of the antenna shorter than in *O. pyrenaella.* Forewing 9 mm long. ♀ amber-colour. The ♂-case 12—14 mm long, tubuliform, slightly incrassate in the middle and somewhat curved at the upper end; the ♀-case 20—22 mm long, strongly incrassate in the upper two-thirds, slightly curved and tapering at the lower end. The case is always composed of agglutinised grains of soil and sand and bears a great resemblance to the cases of *Talaeoporia* and *Rebelia.* Larva whitish yellow, with the head and thoracic plates blackish, the latter marked with white. In the higher Pyrenees, in July. — *nigricans.* **nigricans** *Stgr.* (55 d), from Central and Northern Spain, has the wings and hair darker.

silphella. **O. silphella** *Mill.* (55 d) comes close to *leschenaulti,* but the forewing is more elongate with more pointed apex, and both wings are much darker with more thickly scaled veins. Hair of body black. Forewing 8 mm. long. ♀ yellowish white with the head and thoracical plates darker. Larva on Dorycnium, whitish with blackish head and thoracical plates, the latter with few markings. The case similar to that of *leschenaulti,* but longer (♂ 19—20 mm), often of a reddish colour, and strongly curved before the anal end. — South-Eastern France and Piedmont.

muscella. **O. muscella** *F.* (55 d). Wings strongly glossy, hyaline, with the veins, margins and fringes darker. The hair of the body long and black. The abdomen hardly extends beyond the anal angle of the hindwing. None of the veins stalked, as is also the case in the previous species. Forewing 9 mm long. ♀ brownish yellow, with brown dorsal plates, beneath grey. Larva black-brown above, with the head and thoracical plates glossy black, and with short hair; on grasses. The larva-case is widened in the middle, covered with dry stalks of grass lengthwise, and usually fastened on the ground. Widely distributed in Central Europe, also found in Armenia. On the wing in May between 9 and 11 a. m. — *sicheliella.* **sicheliella** *Brd.* (55 d) is very close to *muscella* and probably not specifically distinct. The wings, however, are strongly darkened in the basal area; the fringes black and prolonged towards the anal angle of the hindwing. The neuration of the forewing is said to agree closely with that of *muscella,* and that of the hindwing with *Hyalina albida.* The expanse is stated in the text to be 18.5 mm. but the figure measures at least 20 mm. — Southern Italy.

fulminella. **O. fulminella** *Mill.* (55 d), from Castilia, is smaller than *O. muscella* (forewing 8 mm long), and its wings are less glossy, more rounded and more brownish. On the wing in May. Larva whitish, with the head and thoracical plates black, the latter with pale markings. The case is covered with fragments of leaves touching one another and appearing to form a second tube. ♀ not known.

gondebautella. **O. gondebautella** *Mill.* (55 d) differs from the last species inter alia in that the two veins between which lies the apex of the forewing are on a very short stalk, while they originate from a point in *fulminella*; moreover, the distal margin of the forewing is more convex and the apex more broadly rounded, and both have a duller appearance, more greyish black, without prominently darker fringes. Is also very closely related to *O. plumifera O.* Forewing 7 mm long. ♀ yellowish with black head and dark thoracical plates separated at the joints by a pale colour; the body otherwise clothed with white wool. Larva incrassate in middle, with black head, thoracic plates also black, separated at the joints by a pale colour. Feeds on grass and hibernates. The case is 12 mm long, not very slender, covered with moss, rather irregularly and lengthways. — Central and South-Eastern France, Lyons (Mus. Berlin).

angustella. **O. angustella** *H.-Schäff.* (= atra *Esp.*, stomoxella *Bdv.*, hirtella *Brd.*). ♂ characterised by the long, narrow, almost elliptical wings, the hindwing being much the shorter, and by the abdomen extending far beyond the anal angle, and being clothed with long hair parted in brushes. The wings glossy, transparent, blackish the veins not stalked. Forewing 7—8 mm long. The ♀ 14 mm long, reddish yellow with darker head and white-haired posterior segments. Larva with head and thoracical plates blackish, the latter being dotted with white. The case is covered lengthways with dead grass-stalks and bears a great resemblance to that of *Psychidea bombycella Schiff.* In Southern Germany, Austria and France. On the wing in June-July. — *bicolorella.* **bicolorella** *Bdv.* (55 d), from the Pyrenees and (?) Central Italy, when emerging has yellow wings, which become black later on with the exception of the basal area.

plumifera. **O. plumifera** *O.* (= atra *aut.* nec *L.*, hieracii *Thunb.* [?], muscella *Dup.*, bellierella *Brd.*) (55 d). ♂ similar to the preceding species, but the wings without gloss and of even width, the abdomen does not extend beyond the anal angle of the hindwing, veins 6 and 7 of the forewing (III 1 and II 5) on a short stalk. ♀ brownish yellow, with darker head. Larva brownish with black head; thoracical plates likewise black, divided by a pale longitudinal stripe. In March on grass and Thymus. The case is 11—13 mm long, covered with short dry vegetable fragments (of lichens, Hypnum, etc.), in dry sunny places. The moth emerges according to the locality, even at the end of February, and is said to occur sometimes in large numbers at higher altitudes, e. g. in the Pyrenees, being distributed in Southern Germany, Austria-Hungary, in the northern districts of South Europe, Portugal (Mus. Berlin), Armenia and the Tarbagatai district; the record from Southern Sweden is probably erroneous. — *valesiella.* **valesiella** *Mill.* is a somewhat paler form from the Alps. — *mediterranea.* **mediterranea** *Led.* (= massilialella *Brd.*) (55 d), from Southern France, Berner Oberland, Italy, Turkey (Mus. Berlin), Caucasus and Mauretania, is larger, the forewing measuring 9—10 mm, but otherwise like *plumifera*; the statement by Bruand that the antenna has shorter pectinations does not appear to be correct.

10. Genus: **Scioptera** *Ramb.*

Here belong a few species which occur only in the high mountains and are distinguished by remarkably long fringes resembling eye-lashes, the wing-membrane being dark-coloured. Otherwise closely agreeing with the previous genus, whose species, however, differ from *Scioptera* in their more robust build of the body.

tenella. **S. tenella** *Speyer* (55 e). ♂: Wings black-grey, almost hyaline, forewing strongly widened towards apex, about subtriangular, with the apex however strongly rounded, the distal margin being oblique. The abdomen does not reach the anal angle of the broadly rounded, obtuse hindwing, and the antenna does not attain to the centre of the forewing. Length of forewing 8—9 mm. ♀ dirty yellow, with polished black head and thoracical plates. Larva full-fed 17.5 mm long, 4—4.5 mm broad, with the head and thoracical plates black and the latter divided in the centre. The case is described as being slender, covered with fragments of leaves and mica, fastened on rocks, and biennial. A case before me from coll. SEITZ, however, is in the centre almost half as broad as it is long (7 resp. 15 mm.), covered with short, small fragments of stalks mostly placed transversely, but not very regularly arranged, all kept together by a very loose web. In the high South-Western Alps and the mountains of Castile. Flies in July and August. — **zermattensis** *Frey* is smaller, darker, and occurs at lower altitudes, particularly near Locarno at the Lago Maggiore, being on the wing already in April. *zermattensis.*

plumistrella. **S. plumistrella** *Hbn.* (= plumigerella *Bdv.*) (55 e) has brown-black, densely scaled, opaque, and narrower wings and an exceptionally long-haired head. Forewing 8—9 mm long. ♀ yellowish white with dark head and thoracic plates. Larva brownish, with black head and brownish thoracical plates, the latter mesially divided by a pale stripe. The case up to 17 mm long, covered with sand and sometimes posteriorly with stalks of grass. — Occurs in the higher Alps not below 2000 m and flies in July; in the Berlin Museum, e. g., from Seis in the Southern Tyrol.

schiffermilleri. **S. schiffermilleri** *Stgr.* (= hirsutella *Schiff.*) (55 e). Recognised by the wings being more thinly scaled, particularly in the apical half, and further differing from the preceding insect in the more pointed forewing with a more oblique distal margin; the colouring more greyish, darkest in the basal areas of the wings. Size considerable, the forewing being 11—12 mm long. The abdomen reaches the anal angle of the hindwing. ♀ whitish yellow, with honey-coloured head and thoracic plates. Larva wine-red, with the head and thoracic plates dark brown, the latter bearing three yellow longitudinal lines. On thoracic segment 1 at each side a semicircular yellow mark filled in with a dark colour. The case is 18—20 mm long, being covered in the ♂ with fragments of leaves and ending in a long white tube, in the ♀ more ventricose and usually only covered with short stalks of grass. — In the Austrian and Bavarian Alps (Allgäu), in the southern Alps of Carinthia, questionably also in Switzerland. Flies in June during the morning.

11. Genus: **Psyche** *Schrank.*

Distinguished from the preceding genus in facies at once by the short and apically very broad forewing, the apex and hind angle being broadly rounded, and the distal margin convex and but slightly oblique. The neuration variable; in the forewing 12 veins, 4 and 5 stalked as are also 8 and 9; hindwing with 8 veins, 7 connected with 8 by an oblique bar, discocellular very oblique, a cell within cell. ♀♀ very robust. The case is very thick and covered with short dry stalks of grass and ribs of leaves all placed transversely.

viciella. **Ps. viciella** *Schiff.* (= siciella *Hbn.*) (55 e). ♂ greyish brown, the body for the greater part clothed with yellowish hair, margins of both wings darker, but the veins hardly so. Length of forewing 10—11 mm. ♀ reddish yellow, thoracic plates and three small horny sclerites on anal segment darker. Larva olive, with the head and thoracic plates black-brown, the latter bearing yellow markings; biennial, e. g. on Vicia and Rhamnus. Pupa of ♀ black, brownish at the ends. Case grey, cylindrical, about 18 mm. long and 9 mm broad in centre. Hungary, Belgium, Southern Sweden, Southern Russia, Bulgaria, questionably also in Asia Minor. — **stettinensis** *Hering* (= fasciculella *H.-Schäff.*) (55 e) is smaller (forewing 9—10 mm long), darker, the forewing less rounded, hindwing always with veins 4 and 5 stalked. The case is only about 15 × 6 mm large. Occurs at Stettin and said to be also found in the higher Alps of Carinthia. — **detrita** *Led.*, from the Altai, has the pectinations of the antenna longer and darker, the body, too, being darker than in *viciella*. Only one but indifferently preserved specimen known. *stettinensis.* *detrita.*

viadrina. **Ps. viadrina** *Stgr.* (55 e), from Silesia, South-Eastern Hungary and Roumania, is very close to *Ps. viciella stettinensis*, but still smaller (forewing 6 mm long) and darker, blackish, as is also the hair of the body. ♀ and larva as in *viciella*, but the case relatively smaller.

constancella. **Ps. constancella** *Brd.* (= milleriella *Led.*) (55 e) is characterised by the wings being rather narrower and the forewing more pointed than in Ps. *viciella*; colouring black-grey, with the hair of the abdomen deep black, long and shaggy, and the veins, fringes and costal margin of forewing black. Forewing 9—10 mm long. Shaft of antenna whitish. Larva and case closely resemble those of the preceding insects, but the case is usually covered externally with a loose web and has a much longer apical tube in the ♂. — In the Pyrenees and Central and Eastern France. In June.

turatii. **Ps. turatii** *Stgr.* (55 e), from Northern Italy, resembles the last species very closely, but the wings are glossy transparent black, the antenna longer and more pointed, the hair of the body more glossy grey. Forewing 9 mm long. ♀ and larva as in *Ps. viciella*, but the case longer, conical, and not so stout.

hampsoni. **Ps. hampsoni** *B.-Baker*. from Egypt, has the wings uniformly yellowish grey, the head being lighter and the thorax darker than the ground-colour. The wings are contorted, with the costal margin excised. In the forewing 1 a anastomoses with 1 b; 6 is present in both wings, but in the forewing does not originate from the lower angle of the cell.

12. Genus: **Eurukuttarus** *Hamps.*

Most easily distinguished from *Psyche* by the absence of vein 6 in both wings.

andrewsi. **E. andrewsi** *Wilem.*, from Japan (Hakodate, Yezo), is black (♂), with brownish grey hair-scales, which are longest and densest in the basal area. — Is said to be similar to *E. pileata Hamps.*, but with the wings more rounded.

nigra. **E. nigra** *Hamps.* (56 g), from Kulu in Kashmir, is uniformly deep black-brown; expanse 17 mm.

decemvena. **E. decemvena** *Hamps.* (56g), from Kashmir, is uniformly dark brown; expanse 17 mm. Differs from *nigra* chiefly in vein 8 of the forewing being absent.

13. Genus: **Barandra** *Moore.*

In the forewing veins 1 b does not anastomose with 1 c, 6 is absent, and 8 is stalked with 9. Vein 6 is absent also in the hindwing; 7 connected with 8 by a transverse bar.

fumata. **B. fumata** *Moore.* Wings smooky grey or pale brown, body brown. thorax black anteriorly and in the centre, with two black spots posteriorly. Antenna pale brown with yellow shaft. Legs yellow. Expanse 22 mm. — Kashmir (Dharmsala). As this species occurs in North India, we figure it in vol. X.

14. Genus: **Sterrhopteryx** *Hbn.*

The pectinations of the antenna shorter. the forewing broader, but longer, with the distal margin more oblique than in *Psyche*; the body slenderer; the ♀ more delicate in build; the thin case irregularly covered with vegetable fragments.

hirsutella. **S. hirsutella** *Hbn.* (= fusca *Haw.*, calvella *O.*, nudella *Dup.*) (55 f). Wings pale brownish grey, semi-transparent, being sparsely covered with hair-scales; forewing 9—10 mm long and broadly rounded at the apex. ♀ yellowish white. with the head and thoracical plates glossy yellow. Larva polyphagous, brownish, with the head and thoracic plates darker, the latter being divided by a pale longitudinal line. The case cylindrical, about 15 mm long, 4.5 mm broad, slender, in the middle rather irregularly covered with bits of bark and leaves, which are mostly placed somewhat obliquely. The ♀-case is shorter than that of the ♂. — Central Europe. England, South-Western Russia, Norway. Sweden. Finland, Northern Italy, Roumania. Amur and Ussuri districts; on the wing in June—July, exceptionally until the middle of August.

standfussi. **S. standfussi** *H.-Schäff.* (55 f) is larger than the preceding species (forewing 13 mm long); the costal margin of the forewing more convex, the wings more grey, and the hair of the abdomen paler. The case is about 20 mm long and 8 mm broad centrally. The larva lives on Calluna, Vaccinium uliginosum and V myrtillus, and closely resembles that of *S. hirsutella*. The cases also are similar, but that of *standfussi* is nearly always almost one-third larger, rather irregularly covered with smaller vegetable fragments, which are nearly all placed transversely but somewhat obliquely and are fastened by means of a loose web. Sometimes some of these bits of plants are considerably longer than the others and far project from the case, some being almost placed at right angles to the longitudinal axis of the case. — In the Alps and the Silesian mountains, Harz mountains, Styria, and Actic Norway (Sydvaranger). Flies in June, at night.

15. Genus: **Phalacropteryx** *Hbn.*

Forewing narrow, long, with oblique distal margin, pointed apex and 12 veins. Hindwing subtriangular, with 8 veins and broadly rounded anal angle. Abdomen with tufted hair. Pectinations of antenna long, incrassate at their tips. The ♀♀ and the cases as in *Psyche*, but the cases outwardly covered with a web, also being larger.

apiformis. **Ph. apiformis** *Rossi* (= fuscella *Hbn.*) (55 f) has brownish scaling on the wings, black body with red hair, and pale yellow antenna and tarsi. The abdomen extends with four-fifths of its length beyond the anal angle of the hindwing and terminates with a rather long and dense tuft of hair. Forewing 8—9 mm long. ♀ whitish yellow, with dark brown head, slightly paler thoracic plates and yellowish brown anal wool. Larva whitish, with the head and thoracic segments bearing black markings; it hibernates and lives on grass and other low herbage. The case is covered with debris of stalks and a dense external web. In Italy, Sicily, Corsica; Bruand also mentions Southern France. Flies May—June. — **siculella** *Brd.* (= melasoma *Stgr.*) (55 f) occurs *siculella.* in Sicily together with the main form and is distinguished by the thorax and abdomen being black.

Ph. crassicornis *Stgr.* (55 f), from Greece, is smaller than the preceding species (forewing 7 mm long); *crassicornis.* antenna and body deep black, pectinations very strong; wings shorter and scaled black-grey. The case as in *Ph. apiformis.* ♀ and larva not known.

Ph. bruandi *Led.* (55 f). Closely related to *Ph. apiformis*, but slenderer, the wings strongly widened *bruandi.* distally, the costal and hind margins of the forewing being almost the same in length and the hindwing hardly longer than broad. Hair of body woolly, but less shaggy than in *apiformis*, the wool black-brown, more greyish above. Forewing yellowish grey in the basal area, almost scaleless in the cell. Hindwing more evenly grey, only darker at the margin. All the fringes black. The shell of the ♀-pupa black, light brown at both ends. Larva on dry grasses, 13—14 mm long and 2.5—3 mm broad. The case composed of stalks placed closely together transversely and the whole surrounded with grey silk. Moth emerging the end of April and beginning of May. — Syria, Beyrut (Mus. Berlin).

Ph. graslinella *Bdv.* (= atra *Frr.*, altribombycella *Brd.*) (55 f). Basal area yellowish in both wings, *graslinella.* otherwise the whole insect blackish. The veins but little darker than the ground. Hair of abdomen long, shaggy, parted, black. Forewing 9—10 mm long. ♀ red-brown with yellowish head and thoracic plates; does not leave the pupa-shell. Larva above blackish, the head and thoracic plates marked with yellow; biennial, on Calluna. The case about 22 mm. long and 2 mm broad, pear-shaped, outwardly covered by a dense grey web; slenderer in more southern localities. Pupa of ♀ black-brown, light brown at the ends. On the wing April—May. — Central Europe with the exception of England, in Switzerland, Denmark, Finland, Livonia, Southern Norway, and Sweden.

Ph. praecellens *Stgr.* (55 f) is a little smaller than the previous species (forewing 9 mm long), the *praecellens.* forewing relatively somewhat broader and in and around the cell with a sharply defined whitish yellow patch. ♀ and larva hardly distinguishable from those of *Ph. graslinella*, but the case is more cylindrical and the external web much less dense, being less dense in the ♂-case than in the ♀-case. Feeds only on *Erica arborescens.* — Castilia (in Mus. Berlin a pair labelled ♂ Graec. ♀ Castil. *Stdgr.*").

Ph. calberlae *Heyl.* is similar to the preceding species, but smaller, the wings being shorter and more *calberlae.* rounded as well as paler. Expanse 17 mm. ♀ 11 mm long and 4 mm broad, yellow, the head and the 3 anterior segments polished, the two last with greyish yellow wool. Larva 20 mm long, black, head and thorax marked with yellow. The case 25 mm long, cylindrical. The ♂-pupa chestnut-brown, the ♀-pupa black, red at both ends. Food-plant probably Erica. Flies in April. — Pyrenees, Southern Tyrol.

16. Genus: **Apterona** *Mill.*

Small delicate moths with broad rounded wings clothed with hair-scales; forewing with 10, hindwing with 7 veins. Antenna pectinate or serrate, and ciliate. Tibiae without spurs, or the hind tibia with short end-spurs. The thin-skinned ♀ has the head and abdomen curved ventrad and does not leave the case. The latter resembling a shell, making 2½ spiral coils and being covered with sand and soil. The larva, which is curved in adaptation to the case, is greenish or yellowish, with black-brown head and light-marked black-brown thoracical plates.

A. helicinella *H.-Schäff.* (= planorbis *Sieb.*) (55 f) occurs only in Sicily. The antenna pectinate, the *helicinella.* wings smooky grey with darker distal margin, and the body very slender. Forewing 5—7 mm long. ♀ dirty yellow, with whitish anal wool. The larva has a greyish green ground-colour and lives on Lotus, etc. The case resembles that of *A. helix*, but is larger, broader and flatter.

A. gracilis *Speyer* (55 g) is larger and paler, more brownish, than the preceding insect. Forewing 8 mm *gracilis.* long. — Andalusia and Arragonia; in June.

A. pusilla *Speyer* is much smaller than *helicinella* and has narrower, deep sooty black wings with longer *pusilla.* fringes. Antenna pectinate as in *helicinella*, the branches gradually decreasing in length towards the tip. Length of forewing 6 mm. The delicate body is almost glabrous and entirely black. The ♂-case is 6—7 mm longer than in the other species of *Apterona*, more strongly curved, and only covered with loose earth. The ♀-case is similar, but larger, more ovate, with the spirals less distinct. The cases are found on the sunny side of cliffs, usually partly concealed in crevices and holes. The larvae are biennial and live on Helianthemum, Satureia, Teucrium and Thymus. Pupa brownish. The moth appears the end of June or beginning of August. — In the Pyrenees, also recorded from Alger.

A. crenulella *Brd.* (= helicinella *Ramb.*, helix *Claus*) (55 g). The ♂ has dust-grey delicate wings with *crenulella.*

long fringes and serrate antenna, the teeth bearing relatively long and dense cilia. Forewing 6.5 mm long. ♀ greyish yellow, with yellowish brown head and brownish thoracical plates; length 7—8 mm. The larva very similar to that of *A. helicinella*, hibernates and occurs on herbage and fruit-trees. Development in June. ♂♂ have been recorded from Southern France, Northern Italy, Southern Tyrol, and (questionably) Vienna; in the Berlin Museum two specimens labelled Berlin (Fromholz), also 2 ♂♂ from Southern Tyrol. — The parthenogenetic ♀-form **helix** *Sieb.* is distributed in Central and Southern Europe and Western Asia as far as Persia and the Issyk-kul and extends northward to Livonia. *helix.*

c. Subfamily: **Chaliinae.**

In the forewing veins 1 b anastomoses with 1 c, but does not send a branch to the hind margin. Hind tibia without spurs, but the fore tibia (in the genus before me) with a very long spine. In the hindwing (cf. *Mahasena*) all 8 veins present, 8 connected with cell by a transverse bar. Forewing with 12 veins. Cell-vein forked at apex in both wings.

17. Genus: **Mahasena** *Moore.*

Antenna very short, the pectinations gradually decreasing in length towards tip. Forewing elongate, with oblique distal margin and short rounded apex. Hindwing much shorter and subtriangular. Abdomen long, thin, far extending beyond the anal angle (by two-thirds in the species before me).

hockingi. **M. hockingi** *Moore* (55 b). Dark brown with a reddish tone. Underside and antenna somewhat paler. Thorax and abdomen with blackish hair. Venis 4 and 5 of the hindwing stalked; the cell-vein short in both wings. Expanse 32 mm. — Kashmir (Kangra).

Appendix to the Chaliinae.

18. Genus: **Plateumeta** *Butl.*

It is only with some doubt that I place here this genus, which is unknown to me, the original description not mentioning several important points. — Wings short and broad. Abdomen extending by two-thirds beyond the anal angle of hindwing. Antenna with short and broad pectination. Cell-vein in both wings simple at apex and indistinct towards base. In the forewing veins 4 and 5 stalked, 6 very little nearer 7 than 4.5, 8 and 9 from a point or very shortly stalked, between them the apex of wing; all the 12 veins present. In the hindwing 4 and 5 from a point, 6 nearer to 7 than to 4.5, 7 into the costal margin just in front of apex, 7 and 8 from a point, but otherwise not connected; the two submedian veins united at the base, but strongly divergent towards anal angle. In the forewing the discocellular straight in front of the cell-vein, but directed obliquely forward and outward, while the corresponding portion in the hindwing is directed straight towards costal margin, but slightly angulate in the middle, the point of the angle outwards. Wings probably bearing upper scales.

aurea. **P. aurea** *Butl.*, from Yokohama, is dark smoky brown; the wings copper-brown with a golden gloss, which is stronger beneath than above; the costal margin of the hindwing above and the hind margin of the forewing beneath silky grey. Expanse 25—26 mm.

d. Subfamily: **Epichnopteryginae.**

Differs from the *Psychinae* particularly in the following points: ♂ with two pairs of spurs to the hind tibia (with the exception of *Stichobasis*); hind legs longer than fore legs; in the forewing 1 a and 1 b distally coincident, 9 usually absent; in the hindwing 7 not connected with 8 by a transverse bar, 4 absent, only 7 veins being present. Wings covered with hair-scales; the abdomen strongly protrusible. ♀ much reduced, does not leave the case.

19. Genus: **Stichobasis** *Kirby.*

Only one species belongs here, which is characterised by the elongate wings having no cell in cell and only 10 veins into the margin, the antenna bearing long, irregularly arranged pectinations. The genus does not well fit into the subfamily, as the hind tibia bears only one pair of spurs.

helicinoides. **S. helicinoides** *Heyl.* resembles *Epichnopteryx pulla*, has the forewing 6—6.5 mm long and flies in April in mountainous districts of Greece.

20. Genus: **Rebelia** *Heyl.*

The wings are clothed with hair-scales and elongate, and bear glossy fringes; forewing with 11 free marginal veins, of which 7 and 8 are usually forked. Fore tibia with a spur which is only half the length of the tibia. Antenna pectinated to the tip, the teeth short and regularly arranged. The ♀ entirely reduced, clothed with woolly hair. The larvae yellow with the head and thoracical plates black, the latter bearing light stripes in the centre and at the sides. The cases have the shape of a beet-root, being externally covered with sand.

sapho.

R. sapho *Mill.* (56 g). In the ♂ the forewing 10—11 mm long, brownish, the fringes having a silky gloss. The ♀ honey-yellow with grey hair. — Hungary, Istria, Croatia, Dalmatia, Northern Italy, questionably also from Switzerland, in May—June. Larva and case resembling those of *R. nudella*, but are larger.

nocturnella.

R. nocturnella *Alph.* (55 g), from Southern Russia and Central Asia, differs in the ♂ from the preceding species in being smaller, having longer antennal branches, weaker scaling, and greyish yellow wings whose fringes have a whitish gloss; the forewing measuring only 8 mm.

karawankensis.

R. karawankensis *Höfn.* (55 g), from Carinthia, is distinguished from *R. plumella H.-Schäff.* by the more delicate and more elongate wings, whose surface and fringes have a silky loam-yellow gloss and whose distal margin appears much less convex. Flies in July. ♀ and early stages unknown.

surientella.

R. surientella *Brd.* (= suriens *Mill.*, ? nigrolucidella *Brd.*) (55 g) is larger and more broad-winged than *R. plumella*, the forewing particularly is strongly widened distally; light greyish brown, the fringes glossy pale brownish. Forewing 9 mm long. — In Western Germany, the southern valleys of the Alps, Dalmatia and Bosnia. ♀ and the early stages as in the allied species.

herrichiella.

R. herrichiella *Strand, nom. nov.* (= plumella *H.-Schäff.* nec *Schiff.*, *Hbn.*), with the forewing 6—8 mm long, is brown with bright brownish yellow glossy fringes; the forewing does not become wider distally as it does in the preceding insect, and the pectinations of the antenna are shorter and less regularly arranged. ♀ pale yellow, with grey woolly hair. The case is usually dark and somewhat curved. — Southern Germany, Austria-Hungary, Romania.

nudella. *vestalis.*

R. nudella *O.* (55 g). ♂: Wings grey with blackish costal and distal margins and pure white fringes with silky gloss. Length 8—9 mm. Body black. ♀ reddish yellow, with yellowish grey wool. Larva on herbage, hibernates. In Lower Austria, Carinthia, Hungary, Central France, Arragonia; flies in June. — **vestalis** *Stgr.* (= pectinella *Hbn.*) is smaller and entirely white. In Southern Russia, Eastern Hungary, Rumelia and Southern France.

staudingeri.

R. staudingeri *Heyl.*, from Sarepta, is much smaller than the previous species (forewing 4.5—5 mm long), and has bluish grey wings with glossy white fringes.

millieri.

R. millieri *Heyl.* is somewhat larger than the last (forewing 6 mm long), more brownish, the wing still more elongate, and the forewing with 8 marginal veins only. — In the southern foot-hills of the Ural Mts.

flavescens. *kuldschaënsis.*

R. flavescens *Heyl.* (55 g), from the Ala Tau, has the forewing barely 5 mm long, yellow, apically suffused with orange, with whitish yellow fringes and 10 free veins; the hindwing is a little more greyish. — **kuldschaënsis** *Heyl.*, from the Tianshan, is larger (expanse 11—13 mm instead of the 9.5 mm of the name-typical form); the colouring is yellow without orange suffusion; the hindwing darker, bluish grey.

21. Genus: **Epichnopteryx** *Hbn.*

The pectinations of the ♂-antenna longer than in the previous genus, irregularly arranged and incrassate at their tips. Fore tibia unarmed. Wings shorter, more rounded, the fringes usually without gloss; forewing with 10 free marginal veins and a cell within the cell. Larva reddish brown with black head, and black-brown thoracic plates divided by a yellow stripe. Case short, densely covered lengthwise with stalks of grass. The ♂♂ fly by day.

hofmanni.

E. hofmanni *Heyl.*, from Sicily, with the forewing only 4.5 mm long, is blackish brown, and differs from the commoner. *E. pulla* inter alia in the long-hairy head and narrower wings. Flies in June.

flavociliella.

E. flavociliella *Mann*, from Asia Minor, is compared with *E. pulla*: not half its size, ground-colour more blackish, fringes pale yellow and silky also beneath. Found the middle of April, on the wing during the morning.

tarnierella.

E. tarnierella *Brd.* (= myrmidonella *Brd.*) (55 g) is the smallest species of the genus (forewing 3.5 mm long), brown with a greyish or yellowish suffusion and whitish yellow glossy fringes; the abdomen extends beyond the anal angle of the hindwing. The ♀ 4 mm long, brown-yellow, with darker head and thoracic plates. Larva wine-yellow, with black-brown head and thoracic plates, the latter divided by a paler thin line; on Holcus mollis. The case cylindrical, but somewhat quadrangular. — Southern France, Holland; in May.

pulla. **E. pulla** *Esp.* (= plumella *Schiff.*, plumistrea *Haw.*, radiella *Curt.*, pullella *Brd.*, pulliparvella *Brd.*, marginenigrella *Brd.*) (55 g). ♂ sooty black, with the fringes of the same colour, the head short-hairy, the body shaggy, and the antennal pectinations long. Forewing 5—6 mm long. ♀ reddish yellow, with whitish anal wool. Larva wine-red, with black head and thoracic plates, the latter bearing 5 yellow longitudinal lines; on grasses. Distributed in Central and Southern Europe, Livonia, at St. Petersbourg, Roumania, Ionian Islands, Western Asia and Amurland. — *pontbrillantella.* **pontbrillantella** *Brd.* (= mentonella *Mill.*, montana *Heyl.*, ? silesiaca *Wocke*) (55 g) is perhaps a distinct species. The forewing is more distinctly truncate and almost double the length (7—8 mm), deep black. Occurs in France, Northern Italy, questionably also in Silesia and England. — *montanella.* **montanella** *Heyl.*, from the Alps of Southern France, has the forewing 7 mm. long, with the apex less rounded. — *sieboldi.* **sieboldi** *Reutti* (= heringi *Hein.*, ? plumella *O.*, ? gruneriella *Brd.*) (55 h) has the wings shorter, less densely scaled and somewhat reddish in tone, and is recorded from the mountainous districts of Germany and France, as well as from the Alps. — *voelkeri.* **voelkeri** *Trautm.* has more broadly rounded wings with light yellow fringes, the thorax and abdomen being deep black; at Jena.

turibulella. **E. turibulella** *Fuchs* (55 h), from Lombardy, is closely allied to *E. pulla*, but the wings are more elongate, the forewing is distally but little widened, more densely and coarsely scaled, purer and deeper black, with the fringes unicolorous to their tips; the antenna with 18—19 long and very thick pectinations which are densely ciliated and quickly decrease in length towards the tip. Flies in July.

ardua. **E. ardua** *Mann* (55 h), from the high Alps, Apennines and Caucasus, is smaller and shorter-winged than *E. pulla* (forewing 4.5 mm long): the wings more thinly scaled and pale brownish grey. Larva and case smaller than in *pulla*, but otherwise similar. — *alpina.* **alpina** *Heyl.*, from the Swiss Alps, is larger (expanse 13 mm) and differs in neuration.

retiella. **E. retiella** *Newm.* (= reticella *Newm.*) (55 h) has white wings with darker reticulation, the forewing being only 4 mm long. The antenna with long pectinations and 15 segments. Body with white hair. ♀ yellow with dark head and paler segmental incisions. Larva yellowish, with black head and thoracic plates, the latter bearing pale stripes; on grasses (Poa) and Artemisia. The case 6—10 mm long, fusiform and covered with stalks of grass. — England, Holland.

undulella. **E. undulella** *Fisch.-Rös.* (55 h) differs from *E. retiella* in its larger size (forewing 5 mm long), narrower grey transverse lines, which render the wing paler, and in the antenna consisting of 19 segments. ♀ similar to that of *E. pulla*. Larva reddish, with black-brown head and thoracic plates, the latter adorned with 5 narrow yellow stripes. Hungary, Southern Russia. Barrett (1894) has seen a specimen which was probably British. In April. — *paveli.* **paveli** *Uhryk*, from Hungary, is larger with the reticulation black instead of grey.

22. Genus: **Psychidea** *Ramb.*

Wings clothed with hair-scales and broad scales, the forewing with 11 marginal veins and a cell in the cell. Fore tibia with a spine which is over half the length of the tibia. Antenna bipectinate. The ♀ less reduced than in the preceding genera, possessing antennae as well as legs, but remains in the case.

bombycella. **P. bombycella** *Schiff.* (55 h). The ♂ varies much in size (forewing 7—11 mm long); the wings broad and ochreous, the forewing with blackish reticulation. ♀ brownish, with whitish anal wool. Larva blackish brown, with black head and thoracic plates, the latter bearing 5 pale longitudinal stripes, and the other segments pale lateral dots. The case is widened centrally and covered with pine-needles and fragments of stalks. Occurs in Central Europe (with the exception of England), in northern South Europe and Bithynia. — *elongatella.* **elongatella** *Brd.*, from Italy and the river Doubs, is described by its author as a variety fo *P. pectinella*, and is said to be distinguished by the still longer and a little darker wings, but probably belongs to *bombycella*. — *rotundella.* **rotundella** *Brd.*, from Switzerland, South-Eastern France, and questionably also from Piedmont, has the wings not reticulated.

pectinella. **P. pectinella** *F.* (= murinella *Dup.*) (55 h) has brownish grey wings which are not reticulated or only at the distal margin, and are narrower than in the last insect, the forewing measuring 8—9 mm in length; moreover, the pectinations of the antenna are shorter and the abdomen darker. Fringes yellowish and glossy. Also the ♀ smaller than in *P. bombycella*. Larva dark brown, with black head and thoracic plates, which latter bear a pale median line. The case is anteriorly pointed in cone-shape, about 18 mm long and 3 mm broad. Austria-Hungary, Eastern France, Pyrenees, Southern Russia, Roumania, Armenia, questionably also in Bithynia and Mauretania. — A paler form from Dalmatia is *perlucidella.* **perlucidella** *Brd.* (55 h).

proxima. **P. proxima** *Led.* (= ledereriella *Brd.*) (55 h), from the Altai and Apennines, is near *P. bombycella*' but deep black-brown with yellowish glossy fringes. Forewing 9—10 mm long. Flies in June.

graecella. **P. graecella** *Mill.* closely resembles *Epichnopteryx pulla*, but the fore tibia has a spine in typical *Psychidea*, and the wings are rather more elongate. Forewing 8 mm long. — Greece, in May.

alpherakii. **P. alpherakii** *Heyl.* (= nocturnella *Stgr.*, rouasti *Alph.*) (56 g). Yellowish grey, body black, but the hair grey. Antenna with 24 segments. Hindwing slightly transparent; all the fringes glossy white. Expanse 13—15 mm. Forewing with 10 free veins. — Tarbagatai district and Tianshan.

raiblensis. **P. raiblensis** *Mann* has light grey, thinly scaled, elongate wings, the forewing bearing a darker reticulation. Fringes glossy light grey. Body dark, with light grey hair. Antenna short. Spine of fore tibia long. Forewing 9 mm long. — Carinthia, in June.

e. Subfamily: **Fumeinae.**

Distinguished from the preceding subfamilies in that the fore tibia always bears a spine; a cell in the cell is usually present, the scaling of the wings consists for the greater part of broad scales; forewing with 11 free marginal veins. The abdomen of the ♂ not protrusible. The ♀ has segmented antenna, legs and protrusible ovipositor and always leaves the case; the latter never covered with sand.

23. Genus: **Fumea** *Steph.*

The pectinations of the ♂-antenna commence already on the third segment, i. e. the first segment of the shaft. The spine of the foretibia may be long or short. ♀ with non-divided dorsal plates on the abdominal segments. Larva reddish yellow, with black-brown head, the thoracic plates also black-brown, marked with yellow. Case cylindrical.

reticulatella. **F. reticulatella** *Brd.* (55 i). Forewing 6 mm long, aenescent-brown, with paler reticulation; hindwing brownish grey, unicolorous. Antenna with long pectinations and brownish. ♀ brownish, with pale yellowish grey anal wool. Larva on tree-lichens, smaller and with sharper markings than in *F. crassiorella*, the case with less coarse covering than in that species. — Dalmatia, Southern France, and Bithynia.

glaphyrella. **F. glaphyrella** *Rebel*, from Morea, has more elongate wings than *F. reticulatella*; forewing light grey to yellowish white, with blackish reticulation; hindwing whitish yellow-grey, with traces of black reticulation before the distal margin. Fringes unicolorous. Head and thorax dark brownish grey, abdomen blackish grey with single yellow hair-scales. Antenna short, bipectinate, the teeth strongly ciliate, clavate, tapering in the last third of the antenna. Expanse 10.8 —14 mm. Flies the end of May.

comitella. **F. comitella** *Brd.* (55 i). The wings pale luteous grey, the forewing with darker network (sometimes indistinct), 7—8 mm long. Antenna with short pectinations, pale yellowish grey. Hind tibia yellowish. ♀ flesh-red, with lighter legs and yellowish white anal wool. Larva similar to that of *F. casta*, but paler. The case with reddish covering studded with pine-needles and stalks. Flies in June in the mountains of France, South-Western Germany, in the Tyrol, Carinthia, Switzerland and Bukowina, questionably also in Armenia. — *saxicolella.* **saxicolella** *Brd.* is a paler form, without dark reticulation, the ground greyish white, fringes and apex of forewing greyish black; France.

norvegica **F. norvegica** *Schöyen* is close to *F. crassiorella Brd.*, but more grey in tint; head with light grey hair; antenna grey, with 20—22 segments; spur of foretibia moderately long, legs greyish yellow, fringes yellowish white, glossy. Forewing with large cell in the cell, expanse 16—20 mm. The ♀ resembles *crassiorella*, but is yellowish grey, head and thoracic plates brownish, the abdominal segments above with brown quadrangular spot, anal wool white. Larva biennial, also similar to that of *crassiorella*, but the head black with paler stripes, the thoracical segments with broad black stripes. Case short, cylindrical, the covering arranged lengthways. Norway, Southern France (Alpes Maritimes), Switzerland; also said to occur in Transcaucasia. — In Hor. Soc. Ent. Ross. 39. 1910 (1912) p. 201—206 the species is fully dealt with by H. BLOECKER.

subflavella. **F. subflavella** *Mill.* resembles *F. comitella*, but is pale yellowish grey; forewing not reticulated, 7 mm long. Spine of fore tibia moderately long. Antenna with 24 segments. The wings are relatively a little broader at the base than in *crassiorella*. ♀ as in *comitella*, likewise the larva, but the latter anteriorly brighter yellow. Case irregularly covered with bitten-off pieces of stalks, fastened on old walls. Flies at the Riviera, at Lucarno and Santa Maria Maggiore in June. — *edwardsella* **edwardsella** *Tutt* has only 20 segments in the antenna and is a very little smaller than *subflavella*; from South-Eastern France.

crassiorella. **F. crassiorella** *Brd.* (= affinis *Reutti*, ? germanica *Chapm.*, ? mitfordella *Chapm.*) (55 i). Forewing vividly glossy aenescent-brown, 8—9 mm long; hindwing duller; both wings broad. Build strong, which is also the case in the ♀; this sex flesh-colour, with darker legs and yellowish grey anal wool. The larva, too, is more robust than in the allied species, the head bearing prominent yellow markings. The case is covered with coarse stalks of grass and fragments of wood, which are raised behind; 12—14 mm long and relatively thick; found on the sunny side of rocks and old walls. Flies the end of May and in June in South Europe and Southern Central Europe, in England, Roumania, and questionably Livonia.

casta. **F. casta** *Pall.* (= nitidella *Hbn.*, intermediella *Brd.*, roboricolella *Brd.* ♂) (55 i) is smaller (forewing 6—7 mm long) and more uniformly aenescent-brown than the preceding species. ♀ reddish brown, above darker, with luteous grey anal wool (white according to other authors). Larva smaller and its black-brown head with less distinct markings than in the preceding insects; on herbage and deciduous trees. The case also is smaller than in *F. crassiorella*, 8—12 mm long, up to 3 mm broad, and covered with thinner stalks, which are placed close together. — The commonest European species and probably distributed throughout Europe, also in Asia Minor and Algeria, questionably in Amurland and China.

rouasti. **F. rouasti** *Heyl.*, from the Ala Tau, is said to have the wing-contour of *Bacotia sepium*, but to come nearest to *F. betulina* in neuration. Antenna grey, the pectinations shorter than in *betulina*. Wings smoky grey with white fringes. Forewing with a long cell in the cell. Thorax and abdomen black, with the hair grey. Legs grey. Expanse 12—14 mm.

betulina. **F. betulina** (= roboricolella *Brd.* ♀, anicanella *Brd.*, ? salicolella *Brd.*) (55 i). Forewing narrower and longer than in *F. casta*, more pointed at the apex, uniformly aenescent, with darker veins, 6—7 mm long. The pectinations of the antenna thinner, not scaled. Head, thorax and abdomen uniformly dark brown. A dark discocellular smear visible on the forewing. ♀ brown-red, black at the sides, with snowy white anal wool. Larva as in *casta*, but the head deep black and without markings. The case is covered with small fragments of leaves and lichens, rarely with some stalks. The species resembles *Bacotia sepium* very much, but differs inter alia in the presence of a cell in the cell, whereas *B. sepium* has an areole. — In Central Europe, England, Western Russia, Sweden, Roumania and Amurland.

eppingella. **F. eppingella** *Tutt* (= anicanella *Chapm.*, ?? salicolella *Brd.*, ?? salicicolella *aut.*) (55 i). Under the name of *salicolella Brd.* (usually written *salicicolella*) a very doubtful species has been known which is said to differ in the ♂ from *F. betulina* in the somewhat larger size and whose ♀ is said to have brownish grey anal wool. I have also arrived at the same result as Tutt, namely that this species of Bruand's can scarcely be different from *betulina*, whereas the insect described by Tutt as *F. eppingella* from England, but also occurring in France, is probably a distinct species differing from *betulina* in the following points: Antenna with 26 segments (in *betulina* 21), wings shorter, more rounded at the end, with the distal margin less oblique; wings scarcely distinguishable from those of *casta* in contour and colouring. The case is said to be nearly as broad as it is long and to be covered with fragments of dry leaves which do not lie close together. Pupa smaller than in *betulina*.

24. Genus: **Bacotia** *Tutt.*

The pectinations of the ♂-antenna commence on the fourth segment, i. e. on the second of the shaft. The spur of the fore tibia is short. ♀ with divided dorsal plates on the abdominal segments. Larva dark, blackish, with black-brown dorsal plates divided by a pale median line on the two first thoracic segments, while the third segment only bears two small plates widely separated from one another. Case bell-shaped. (Cf. the following genus for further characteristics.)

sepium. **B. sepium** *Speyer* (= tabulella *Guen.*) (55 i) has very elongate and pointed wings which are aenescent-brown, have a yellow sheen and bear sometimes light watermarks; a darker discocellular smear present; forewing 6—7 mm long (cf. also *Fumea betulina*). ♀ dark brown, yellowish at the sides, with yellowish grey anal wool; head brown, with large black eyes. Larva hibernates and feeds chiefly on the lichens of Gymnosperms. — In Central Europe, Western Russia and Roumania; flies in June and July.

25. Genus: **Luffia** *Tutt.*

Differs from the previous genus in that the first pair of pectinations, situated on the fourth antennal segment, are very short, vein 1 c of the forewing is always distinct basally (vestigial in *Bacotia*), and in that the cross-vein between veins 5 and 7 of the hindwing is straight (angulate in *Bacotia*). The ♀ sometimes parthenogenetic. Larva on lichens of rocks.

lapidella. **L. lapidella** *Goeze* (= lapicidella *Zell.*, lapicidella *Guen.*, pectinella *Dup.*, ? pinastrella *Mill.*). ♂ dust grey, with pointed wings and long, irregularly arranged, antennal pectinations. Forewing indistinctly reticulated, 4—4.5 mm long, with vestige of a darker discocellular smear. ♀ brownish, with yellowish grey anal wool, antenna with 14 segments. Larva blackish grey, with blackish brown head and lighter plates on the two first thoracic segments, while the third segment only bears two small brown lateral plates. The case at first cap-shaped and 5—6 mm long, later on narrowed towards its upper end. — In Southern Spain, Switzerland, France, England, Corsica, Italy, Dalmatia and the Canaries.

ferchaultella. **L. ferchaultella** *Steph.* appears to be the parthenogenetic ♀ of the preceding insect; it differs from the ♀ of *lapidella* in its smaller size, darker colouring, more strongly curved claws and the 12-segmented antenna. — England (?), France, Switzerland and questionably also Italy.

maggiella. **L. maggiella** *Chapm.*, from the Tessin, is distinguished from *L. ferchaultella* only in that it is not parthenogenetic. Antenna with 12 segments. ♂ not known.

f. Subfamily: **Moffatiinae** *subfam. nov.*

Hind tibia with 2 pairs of spurs, hind legs quite short, the fore legs on the contrary very long, with long first tarsal segment, the tibia bearing a long spine. In the forewing 1a and 1b separate at the base, then coincident to the outer margin without sending a branch to the hind margin. In the hindwing 8 connected with 7 by a transverse bar, 7 free marginal veins, vein 6 being absent, while the forewing has 12 veins, of which 4 is stalked with 5 and 8 with 9. Wings with hair-scales.

26. Genus: **Moffatia** *Moore.*

Characterised inter alia by the long prominent anal tufts directed straight sideways; the distance from tip to tip of the tufts measured across the tip of the abdomen equals the length of the body; moreover, the bipectinate antennae are unusually long, almost as long as the forewing. The latter rather pointed, with oblique distal margin.

M. plumicauda *Moore.* Greyish black, the anal tufts black. Wings hyaline, very sparsely clothed with small thin hair-scales, the margins broadly black, the veins also black. Expanse 24 mm. Case fusiform, covered with short fragments of dry grass-stalks. Flies in October and November from the morning till 4 p. m. on sunny stony places. — North-West Himalayas: Upper Kunawar. *plumicauda.*

Alphabetical List

of the Palearctic forms of *Psychidae* with references to the original descriptions.

* signifies that the form is figured at the place cited.

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24. Family: Thyrididae.

This small family, which is represented in the Palearctic Region by some 20 forms, would be better placed with those Lepidoptera which are generally called Micros. But as in the case of the *Sesiidae*, we bring them in this volume, which contains the heterogeneous mass of "Bombyces". They are in fact doubtless nearest related with the Pyrals; but they exhibit also affinities to the *Drepanidae*. The family contains more than 180 species of very varied facies, belonging to 26 genera, half of which are monotypical.

The distribution is almost universal, but the tropics and subtropics take the larger share. In the various countries of Europe at most one form occurs, which, moreover, is sporadic, the *Thyrididae* not at all being represented in many districts of this continent. They are generally not rare where they occur. Some are decided day-fliers, others appear to be on the wing regardless of the time of day. I have observed, e. g., species of *Dysodia* fly in the hot sunshine and also visit the lamp at night. Some species have almost the habits of *Geometridae*, resting by day concealed on the underside of leaves and when flushed flying only a few yards before disappearing again in the bushes. The larvae are only known of a few species. The larva of *Thyris* is common in Central Europe and is remarkable for its bug-like scent.

Palpi nearly always thin, but different in length. Characteristic is the absence of the maxillary palpi. Proboscis present, usually well-developed and used for sucking. The submedian of the forewing forked, veins 4—8 from apex of cell, 2—11 from cell. The wings have frequently an excised or irregular distal margin and sometimes hyaline spots. Moreover, the costal margin of the forewing not rarely is ventricose or bears bladder-like swellings. The antennae are nearly always simple, being rarely shortly pectinated. — The larvae, as far as they are known, live inside the plants or make a protecting hood; they have 16 feet and bear sparse hairs.

The family has been monographed several times, e. g. by A. Pagenstecher and G. Hampson.

1. Genus: **Thyris** *Lasp.*

This genus contains 5 very similar forms, which are confined to the temperate districts of the Northern Hemisphere. Characteristic is the open cell of both wings. The forewings have a curved distal margin and pointed apex, the hindwings are excised below the apex. Across the disc of both wings small hyaline spots. The body robust compared with the small wings, and the abdomen peculiar, appearing suddenly narrowed beyond segment 5 with the apex pointed. The larvae are green, bearing sparse minute bristles; they live in a case made of the leaves of the food-plant and slightly smell like bugs. The moths have one brood and fly in the sunshine, resting on flowers with the wings spread out, particularly on Umbellifers and Scabious.

T. fenestrella *Scop.* (= fenestrina *Schiff.*, pyralidiformis *Hbn.*) (50 e). Dark brown, the wings with *fenestrella.* blackish reticulation; fore- and hindwing similar in colour, dark brown; scaling of body with a coppery gloss. The hyaline spots rather large, composed of smaller spots, or cordiform. Almost everywhere in South and Central Europe, but local; in Northern Europe only sporadical, in Holland, Livonia, also in Anterior and Central Asia to Amurland. The green, sparsely hairy, larva on Clematis. Abundant in many localities. — **nevadae** *nevadae.* *Oberth.* (50 e), from Eastern Spain, differs in its paler colouring and the strong reduction of the hyaline spots. This form has been placed by Dyar as a variety with the (entirely different) North American *T. lugubris Bdv.*; the latter, however, is much larger, more robust, and deeper black. The South European specimens of *fenestrella* appear to have always smaller vitreous spots than the Central European ones; at least, the hyaline spots are smaller in the series obtained by me at Genoa than in the examples I have collected in Germany.

T. diaphana *Stgr.* (= vitrinia *H.-Schäff.* nec *Bdv.*) (50 e) differs from the preceding species in the *diaphana.* colouring being golden brown instead of black-brown; the hyaline spots are very small, sometimes disappearing on the forewing, and forming on the hindwing a continous band. — Hitherto only known from Sicily.

T. usitata *Butl.* (50 e) is the East-Asiatic form, which comes very close to *fenestrella*. Specimens from *usitata.* Amurland are not essentially different from European ones according to Staudinger. On the whole the specimens are somewhat smaller, with more pointed wings and smaller hyaline spots than in Europe. Certainly only a local form of *fenestrella*. — Widely distributed in Eastern Asia, occurring in China, Japan, Amurland and Corea.

2. Genus: **Hyperthyris** *Leech.*

Larger and more robust than the previous forms, the body stouter, the abdomen not narrowing abruptly at segment 5 and not so pointed. Head broad; palpi hairy, upturned, segment 3 naked and acute. Tibiae with long hair. Wings entire, of ordinary contour, the cell closed in the forewing, open in hindwing; the distal margin of the latter somewhat curved, with obtuse apex. Both wings hyaline on the disc. — One Asiatic species, which occurs in India and China, crossing the Palearctic boundary in the East.

aperta. **H. aperta** *Leech* (50 e). Black, the collar edged with golden brown, the wings vitreous, with black border. Forewing with a large, triangular, black patch in the middle of the costal margin. — Kiukiang in China. Our figure is taken from the type in coll. Leech, London.

3. Genus: **Dysodia** *Clem.*

This genus, better known under the later name of *Varnia*, comprises 7 species, of which 3 occur in America, 3 in India and 1 in Africa. The species which crosses the Palearctic boundary in Kashmir, is very widely distributed and has been redescribed over and over again. The body of *Dysodia* is exceedingly stout, and the very small head bears obliquely upcurved palpi of medium length. The cell is closed in both wings; the apex slightly produced, the outer margin feebly ventricose at the tips of the median veins; the hindwing bears a discal spot which is nearly or entirely without scaling. — The moths have a clumsy flight, and fly by day in the sunshine clearings on in woods, but also come to the lamp at night.

ignita **D. ignita** *Walk.* (= inaequalis *Walk.*, rajah *Bdv.*, siculoides *Feld.*, fenestrata *Moore*) (50 e). The body clothed with very smoth and glossy scaling, the thorax as well as the abdomen, purplish brown like the wings; the latter minutely pencilled, the marginal area paler; in the disc of the hindwing a cordiform median spot, which is thinly scaled or entirely hyaline; as the spot is always vitreous in strongly worn specimens, it appears probable that it is scaled in freshly emerged individuals and that the scaling disappears when the specimen takes to the wing. *ypsiloides.* Widely distributed in India, where also occurs the form **ypsiloides** *Pagenst.*, characterised by the paler ochreous colouring, feebler markings and the Y-shaped vitreous spot on the forewing. — The moths are not rare in grassy places; their flight is very awkward, so that a specimen on the wing has, in consequence of its unusually heavy body, almost the appearance of a beetle or a tree-bug.

4. Genus: **Glanycus** *Walk.*

Allied to the preceding genus in the stout build and the vitreous spot on the hindwing, but differs in the cell of the hindwing being open and the forewing having the apex broadly rounded and the distal margin not incurved below the apex, but on the contrary excurved. — Only 3 species in Asia, two of which, *G. insolitus Walk.* and *tricolor Moore*, occur in India, while the third is found in the East of the Palearctic Region.

blachieri **G. blachieri** *Oberth.* (50 e), from Siao-lu, is only known to me from Oberthür's figure, of which we bring a copy. Oberthür, who does not mention anything else about the nature of the insect, desires to make the genus containing this species the type of a separate family, which he calls "*Glonycinae*". However, he abstains from any description or characterisation of this family. As the *Thyrididae* are a somewhat heterogeneous family, about whose affinities opinions are very much divided, the proposition may be worth considering.

5. Genus: **Herdonia** *Walk.*

Two species form this genus, one being American and the other Asiatic. Body stout, but not so thick and short as in *Dysodia*. Palpi upturned, short. Forewing with the apex pointed and the distal margin curved; hindwing with the outer margin evenly rounded. Cell closed in both wings, that of the hindwing divided by cell-veins. — The facies of the moth recalls Geometers, while the long legs remind one of the Pyrals.

osacesalis. **H. osacesalis** *Walk.* (50 e). One of the larger species of the family. Whereas the markings are irregular on the forewing, the hindwing is crossed by two whitish mother-of-pearl bands, which are separated from one another by a red-brown band divided by a thin pale line; the base of the wing also bears minute dots of mother-of-pearl. — India and China, as far as Central and North China, but not reaching to Amurland, also absent from Japan.

6. Genus: **Dixoa** *Hamps.*

Based on a species from North-West India which just touches our Region in Kashmir. Palpi very minute, hairy, upturned; body smooth, stout, but the abdomen more pointed than in the preceding genera.

Wings entire, the forewing with pointed apex and hardly curved distal margin; both wings minutely pencillated transversely, unicolorous, with the cell closed.

D. albatalis *Swinh.* (50 e). White, with a slight silvery or greasy gloss; wings dusted all over with *albatalis.* minute grey or slightly golden brown atoms, which are united in places to form a thin network with minute meshes. Facies, rest-position of wings and flight entirely as in Pyrals. — Anterior India, Poona, Kanara. I found the species at the foot of the Nilgiri Hills, but did not meet with it in Ceylon. Appears to be rarer in Palearctic Kashmir than in tropical India.

7. Genus: **Striglina** *Guen.*

Distributed in 5 species over the countries of the tropical zone; the only Palearctic species extends northward to Japan and Amurland. Moths rather small, with the head relatively large and the medium-sized palpi upturned. Frons with tuft of hair. Antenna of ♂ slightly incrassate and flattened. The tibiae with long hair. Forewing broad, with the apex pointed and somewhat produced, and the distal margin almost straight. Cell closed in both wings.

S. scitaria *Walk.* (= pyriniata *Walk.*, reticulata *Walk.*, lineola *Guen.*, thermesioides *Snell.*, strigosa *Moore*, *scitaria.* navigatorum *Feld.*, superior *Butl.*, vialis *Moore*, strigipennis *Moore*, cancellata *Christ.*) (50 f). Strongly variable in colouring, leather-yellow, rust-brown or yellowish grey, varying in appearance according to the density of the minute dark pencilling with which the wings are covered. Constant is a thin double line running obliquely across the wings from near the apex of the forewing to the middle of the abdominal margin of the hindwing, and being exteriorly shaded with a dark tone. On the hindwing, at the point where the line enters upon it, a thin line branches off which varies in distinctness and terminates at the outer margin, so that two apical thirds are separated from the anal third of the wing-surface. Underside of forewing with a white-centred median spot before the cell-apex. — Very widely distributed; from Amurland and Japan over India and the Malay Archipelago to Australia, and also on various South-Sea islands, usually abundant.

Probably very close to this species is *Camadena polystacta Elw. Hamps. & Dudg.* collected during Younghusband's expedition to Tibet. But the species was apparently obtained before the expedition reached Palearctic territory; for that reason we refer the species to the Indo-Australian part of this work (vol. X).

8. Genus: **Hypolamprus** *Hamps.*

Small and delicate moths with the facies of Pyrals, broad but short head, globular thorax, and pointed conical abdomen. Palpi upturned, reaching beyond vertex; the antenna of the ♂ somewhat incrassate. Tibiae smoothly scaled. The wings entire, the apex of the forewing rather pointed, the distal margin slightly curved; the cell closed in both wings. — 14 species are known; they are distributed from temperate Asia to Australia, reaching the Palearctic Region in West China and in the North-Western Himalayas.

H. subrosealis *Leech* (50 f). This species is unknown to me; we therefore bring a figure of the type *subrosealis.* in coll. Leech in the Brit. Mus. and repeat Leech's original description: "Primaries ochreous, strongly suffused with pink, and traversed by several faint narrow brownish wavy lines, one of which beyond the blackish discal spot is sharply elbowed; costa rather paler, spotted with linear patches of brown. Secondaries pinkish red tinged with ochreous, and sprinkled with numerous faint dots arranged in transverse lines. Fringes pale brown, chequered with dark brown. Under surface pale ochreous, tinged with pink and dotted and lined with brown. Expanse, 20 mm. An example of each sex taken by my native collector at Ningpo, in June, 1886".

H. striatialis *Swinh.* (= intimalis *Moore*). In markings like a small *D. albatalis*, but the colour uniformly *striatialis.* yellowish brown. The minute pencilling — which varies much individually — forms transverse lines and sometimes a kind of median band. — Distributed throughout Anterior India to Kashmir, also in Ceylon; often not rare. Size very variable, but always inferior to that of *D. albatalis* and scarcely reaching that of *subrosealis*.

9. Genus: **Rhodoneura** *Guen.*

Over a hundred species from all continents with the exception of Europe are placed into this genus. The moths are mostly rather small, somewhat recalling Pyrals, and little variegated; the wings of the ordinary type, i. e. the forewing triangular, broad, with acute apex, the hindwing relatively large, with evenly rounded distal margin. Palpi upturned, segment 2 densely scaled, 3 short and naked. Tibiae smoothly scaled. Veins 4 and 5 close together from near lower angle of cell, 6—10 from near upper angle; 3 and 4 of hindwing from near lower cell-angle, 6 and 7 from near upper angle. — Nothing is known of the early stages.

R. guttata *Christ.* (50 f). This species, described by Christoph as a *Sericophora*, has the general scheme *guttata.* of marking as in *Bupalus piniarius*. The pale discal spots visible in the figure are a little transparent, but not vitreous. The hind tibia is incrassate. ab. **lucidolina** *Pouj.*, from Tibet and the neighbouring districts *lucidolina.* of West China, is smaller and darker; but also in Amurland occur specimens which are much darker than our figure. — Distributed from Tibet over West, Central and North China to the Ussuri district and Corea; feeding by day on Umbellifers.

myrsusalis. **R. myrsusalis** *Walk.* (= elaralis *Walk.*, idalialis *Walk.*, cinereola *Feld.*, scallula *Guen.*, pyraliata *Moore*, lobata *Moore*, zonula *Swinh.*, radiata *Pagenst.*) (56 f). Brown, shaded with grey or yellowish to a varying degree, so that the colouring and shading is very changeable, having sometimes even a pink tone. Both wings pencilled with minute brown lines. At the cell-apex of the forewing usually some small hyaline spots which are united to form a patch. — One of the most widely distributed Lepidoptera, occurring throughout Southern Asia, being often abundant, and also throughout the warmer districts of America and in Southern Africa.

exusta. **R. exusta** *Butl.* (50 f). Similar to *R. pallida* (50 f), but the costal margin less pronounced white and the forewing divided into a large darker basal area, and a narrower and paler marginal area, in which *ardens.* latter the dark pencilling is more distinct; from Japan, also in India. ab. **ardens** *Butl.* (50 f), which flies together with true *exusta*, is red-brown instead of ochreous. — Continental specimens differ a little from *erecta.* *exusta* and are named ab. **erecta** by Leech.

pallida. **R. pallida** *Butl.* (= obliquistrigalis *Warr.*) (50 f). This small moth, which agrees in size and shape with the preceding one, is at once recognised by the broad white costal stripe to the forewing and further differs from *R. exusta*, together with which it has been placed into a genus "*Microsca*", in the pale base of the hindwing. — The type came from Yokohama: as the species is found in Sikkim and Assam, one may assume that it also occurs in China.

nitens. **R. nitens** *Butl.* (= hamifera *Moore*, marginepunctalis *Leech*) (56 f) is close to the preceding species, but the forewing is paler, more whitish olive or whitish brown, with a slight darker suffusion especially behind the cell, with minute darker bars and lines. Diffuse darker bands before, in and beyond the middle, at or just below apex a white pencillated spot. The hindwing with somewhat darker clouds, the proximal band absent. — Widely distributed and variable: from Anterior India and Ceylon to the Solomon Islands in the South and Japan in the North.

acaciusalis. **R. acaciusalis** *Walk.* (= minicula *Guen.*, sordidula *Plötz*, rosacea *Pagenst.*) If all the forms united with it really belong to *acaciusalis*, the species is very variable. It strongly recalls in markings *R. pallida* *Butl.*, but is larger and its colouring usually paler, often almost white. The dark atoms, especially around the centre of the forewing, are grouped together into chains of spots which run across the wing. Specimens from Burma appear to have the pencilling very poor, while in Sikkimese examples the striation of the hindwing *strigatula.* is especially abundant. — The Palearctic form, from China, **strigatula** *Feld.* (50 f), which we figure, differs from Indian specimens particularly in the reduced brown marking on thorax and forewing and increased pencilling.

Alphabetical List

of the Palearctic forms of *Thyridae* with references to the original descriptions.

* signifies that the form is figured at the place cited.

acaciusalis Rhod. *Walk.* Cat. Lep. Het. Brit. Mus. 19. p. 901.
albatalis Dix. *Swinh.* Proc. Zool. Soc. Lond. 1889, p. 422. *
aperta Hyperth. *Leech.* Trans. Ent. Soc. Lond. 1889, p. 122. *
ardens Rhod. *Butl.* Ill. Typ. Lep. Het. Br. Mus. 3, p. 71. *
blachieri Dys. *Oberth.* Ét. Lép. Comp. 4.
diaphana Thyr. *Stgr.* Cat. Lep. Eur. (1), p. 19.
erecta Rhod. *Leech.* Entomologist 1889, p. 66. *
exusta Rhod. *Butl.* Ill. Typ. Lep. Het. Br. Mus. 3, p. 71. *
fenestrella Thyr. *Scop.* Entom. Carn. p. 217.
guttata Rhod. *Christ.* Bull. Mosc. 1880 (2), p. 65.
gulta Dep. *Walk.* Cat. Lep. Het. Brit. Mus. 33, p. 825.
lucidulina Rhod. *Pouj.* Bull. Soc. Ent. Fr. 1894, p. 186.
myrsusalis Rhod. *Walk.* Cat. Lep. Het. Brit. Mus. 19. p. 892.
nevadae Thyr. *Oberth.* Ét. d'Ent. 8, p. 33.
nitens Rhod. *Butl.* Ann. Mag. Nat. Hist. (5) 20, p. 116.
osacesalis Herd. *Walk.* Cat. Lep. Het. Br. Mus. 19, p. 964.
pallida Rhod. *Butl.* Ill. Typ. Lep. Het. Br. Mus. 3, p. 71. *
seitaria Strigl. *Walk.* Cat. Lep. Het. Brit. Mus. 26, p. 1488.
striatalis Hypol. *Swinh.* Proc. Zool. Soc. Lond. 1885, p. 875.
subrosealis Hypol. *Leech*, Entomologist 1889, p. 66. *
usitata Thyr. Rom. Mém. Lép. 6, p. 244.

25. Family: Aegeriidae (Sesiidae).

A well-defined family, whose species are related to the Cossids, their larvae having the same habits as in that family. The moths of the *Aegeriidae* resemble Hymenoptera and many species bear names refering to members of that order. The popular name of "Clearwing" sufficiently characterises this family, by far the greater number of species having entirely vitreous hindwings and the forewings provided with more or less large hyaline spots. The forewing bears as a rule 3 such vitreous patches, the wedge-spot in the cell, the longitudinal area below the cell at the hind margin, and the distal vitreous area in the proximal portion of the distal-marginal area. The hyaline patches are rarely rudimentary (in *Paranthrene, Dipsosphecia, Chamaesphecia* a. o.), while in *Sphecia* and *Aegeria* the forewings are almost entirely vitreous or bear only sparse scaling which breaks off during flight. *Microsphecia*, however, has the forewing entirely scaled. In a very few species also the hindwing is completely scaled (e. g., in ♀ of *D. tancrei Püng.*, and *W. agdistiformis Stgr.*), although not so densely as in other families. The forewing is exceedingly elongated and narrow, being somewhat broader towards the distal margin; the margins are scaled, and usually also the cross-vein bears a more or less broad or very narrow band. The hind margin is scarcely curved, the distal margin short and oblique, the hind angle rounded. Areole absent. With 11 or 12 veins. Vein 1 a of the forewing close to the hind margin or only marked as a chintinous fold, sometimes forked at the base; 2—11 from the cell, 5 sometimes absent; 7 and 8, with the exception of *Microsphecia*, on a long stalk; 1 b strongly reduced, 1 c absent. Hindwing mostly with scaled margin, somewhat shorter but much broader than the forewing, the abdominal margin short, the distal one oblique, and the anal angle rounded, with 3 submedian veins; the thin inner submedian vein basally forked and usually forming a distinct loop, either the anterior or the posterior branch reaching to the distal margin; 1 b almost always reaching to the distal margin or distally vestigial, vein 5 absent, 7 and 8 coincident; frenulum always well-developed in both sexes. Antenna usually gradually incrassate distally, ending in a short point bearing a brush of hairs; in some genera (*Bembecia Microsphecia*) setiform. Eyes naked, ocelli large. Palpi well-developed, rough-scaled; maxillary palpi aborted Proboscis mostly distinct, but obsolescent in some genera or absent. Thorax robust. Abdomen in ♂ with 7, in ♀ with 6 segments, usually terminating with a tuft of hair. Legs strong and mostly long, with the tibia strongly scaled or hairy, sometimes bearing some separated tufts of hair; mid tibia with end-spurs, hind tibia with strong mid-and end-spurs; fore tibia much shorter than the femur, with long epiphysis.

Most species very small to moderately small, one-brooded, and flying very briskly in the sunshine. Only the species of *Bembecia* and *Weismannia* are night-fliers. The Aegeriids can be obtained towards evening by sweeping the food-plants or flowers; towards morning freshly emerged specimens are found sitting on the stalks or stems of the food-plants.

The Aegeriids closely agree with the *Cossidae* in the larval habits and the mode of pupation. The larvae only bear a few thin hairs, are bone-yellow or dirty white, with dark brown head and neck-plate, and strong mouth-parts; they have 16 legs, the 10 abdominal ones bearing complete rings of claws. They hibernate twice or only once and live in the interior of stems and branches of trees and shrubs, or in roots, more rarely in the stalks of herbage. They pupate in a cocoon formed of fragments of gnawed wood or in the end-portion of its tunnel. The pupae slender, with very diverse frontal processes, the abdomen bearing belts of spikes; the anal end rounded or truncate and bearing a ring of 6—12 small hooks or spikes, with the helf of which the pupae usually crawl half out of the cocoon shortly before the moth emerges. The cases of the appendages of the pupa are separate from the body after the moth has emerged. Some species of *Dipsosphecia* and *Chamaesphecia* make tubular webs at the root, in which the larva and pupa move up or down according to the degree of moisture. The moths are excellent fliers and are comparatively rarely caught, as they very closely resemble Hymenoptera on the wing; it is therefore advisable to hunt for the hibernated larvae or chrysalisses and to search especially for those species whose life-history is still entirely unknown; the moth is usually found resting on the food-plant or in its neighbourhood.

As regards the nomenclature of the family it is necessary to state that according to the current rules of Nomenclature the name of *Sesia F.* 1777 (type: the Sphingid *tantalus*) is no more available in this family than *Trochilium Scop.* 1777 (a nomen nudum). LASPEYRES enumerates in his "Sesiae Europae" in 1801 no less than 21 species, of which however 3 are only aberrations. He unites all the species (*apiformis Cl.*, *tabaniformis Rott.*, *spheciformis Gerning*, *hylaeiformis Lasp.*, etc.) as *Sesia*. Fabricius in 1804 was the first to erect a new genus, *Aegeria*, in which he places *apiformis Cl.* as the first species, the name of the genus, moreover, being taken from the food-plant of this well-known moth. Therefore, the type of *Aegeria F.* is *apiformis*, and the family must accordingly be named *Aegeriidae* from this oldest genus. In 1815 Oken employs the name of *Trochilium* with *apiformis* as type, that generic name therefore, is a synonym of *Aegeria*. In Hübner's Verzeichniss 1822 the following genera are erected: 1. *Sphecia Hbn.* (type: *crabroniformis Lewin*), which we keep here separate in spite of its close relationship with *Aegeria*; 2. *Paranthrene Hbn.* (type: *asiliformis Rott.* r. *rhingiaeformis Hbn.*), of which *Sciapteron Stgr.* (r. *Sciopterum*) 1854 is a synonym; 3. *Bembecia Hbn.* (type: *hylaeiformis Lasp.*), which has always been correctly employed; 4. *Synanthedon Hbn.* (type: *vespiformis L.*); 5. *Conopia Hbn.* (type: *stomoxyformis Hbn.*), of which *Thamnosphecia Spuler* is a synonym. The latter two genera are here united under the former name in order to avoid separating the natural group of tree- and shrub-feeding species. In his dissertation de Sesiis agri Berolinensis 1854 Staudinger created the generic name *Sciapteron*, which however falls to *Paranthrene*, whereas now a new name, *Microsphecia*, must be proposed for *tineiformis Esp.*, *myrmosaeformis H.-Schäff.*, and *hoplisiformis Mann*, which have hitherto been placed in *Paranthrene*. Staudinger's "Beitrag" in the Stett. Ent. Zeit. 1856 is a most excellent work for that time, in which all the then known Palearctic species are dealt with and their synonyms fixed.. The nomenclature of the genera is the same which he employed in his Catalogues of 1871 (ed. II) and 1901 (ed. III). Staudinger has also later on published more new species of this family than any other author, and it is much to be regretted that he has not again given a survey of the group. Spuler, in his Schmetterlinge Europas 1910, separated as *Thamnosphecia* the tree- and bush-feeding species of the genus "Sesia" as employed by Staudinger, which name, however, sinks as a synonym of *Synanthedon Hbn.* The species living in the roots of herbage have been separated by Spuler, to whom we are also indebted for a very careful examination of the veination of the *Aegeriidae*, into 2 groups: *Chamaesphecia Spul.* with distinct proboscis, and *Dipsosphecia Spul.* with aborted proboscis. We have adopted both genera, and also *Weismannia Spul.* (type: *agdistiformis Stgr.*), which has many peculiarities and is especially interesting as being a night-insect. It will at a future date also be found necessary further to divide the genus *Chamaesphecia*, but this cannot very well be done before a knowledge of the habits of the larvae, which are quite unknown of many species, renders the natural grouping more evident.

1. Genus: **Aegeria** *F.* (1804).

Antenna half the length of the costal margin or shorter, with an apical brush of hair, incrassate before the tip, in ♂ beneath with strong lamelliform teeth. Palpi strong, upturned, extending above the head, with short, well-marked end-segment. Proboscis reduced, filiform in *melanocephala*, twice the length of the head. Mid and hind tibiae with furry hair, longer in ♂, shorter in ♀. Wings vitreous, with scaled margins. In the forewing veins 7 and 8 on a long stalk (which is short in *pimplaeformis*); 3 and 4 of hindwing from lower cell-angle, separate or on a short stalk; cross-vein of hindwing oblique. Body clumsy, abdomen only in ♂ with a short anal tuft. — Eggs elongate-globular. Larvae cylindrical with flat head; they hibernate twice and live in the stems of Populus and Salix; pupation in the bark or in the ground close to the tree-trunk, pupa long. — In Europe only 2 species, one in Asia Minor, another in Central Asia. Type: *Ae. apiformis Cl.*

apiformis. **Ae. apiformis** *Cl.* (51 a). Body black, abdomen ringed with yellow. Antennae black above, brown beneath. Eyes above edged with white, with yellow towards underside. Occiput with yellow hair. Palpi yellow, brownish at the apex. Collar black; anterior half of the patagia yellow. Breast black-blue, anterior coxa brown-black; femora yellow, black on inside, tibiae and tarsi dirty brown, rust-brown inside. Wings bordered with brown, most broadly so the outer third of the costal margin of the forewing. The latter with black base, a yellow subbasal costal spot, and the cross-vein rather broadly scaled with brown. Before the moth has been flying the wings, particularly the forewing, is covered with rust-brown scaling which easily falls off. Gynandromorphic specimens have several times been obtained. Distributed with the food-plants throughout Europe (with the exception of the higher North), Central Ural, Uralsk, Northern Caucasus, Armenia, North-Western Asia Minor, Turkestan to the Altai, and also found in North America, where it has been introduced with the food-plant. — *sireciformis.* The following aberrations are known: ab. **sireciformis** *Esp.*, darkened to rust-brown, only with yellow hair on the head, yellow spots on the patagia and yellow underside of the tip of abdomen; the black incision with a more or less yellow tone; local, only in Southern Germany, Grisons, Austria, Hungary, Transsylvania and island of Zealand. *tenebrioniformis.* ab. **tenebrioniformis** *Esp.* (50 m) is the rare form with black abdomen (bearing sometimes a few yellow scales in place of the yellow belts), velvety black legs, dark head and black-brown wing-margins and veins; forewing without yellow basal spot; very rare and only known from Southern Germany, the Valais and Grisons, Vienna, Hungary and Transsylvania; the upper part of the patagia is yellow as in all the forms of the present species. A very peculiar form is ab. **brunnea** *Caflisch* *brunnea.* (50 m), the wing-membrane being uniformly dark coffee-brown and the veins dark brown; only known from the Lower Engadine, Zürich and Halle, very rare. ab. **caflischi** *Standf.* is a combination of *brunnea* *caflischi.* and *tenebrioniformis*, the entire wing-menbranes being blackened and the black abdomen and femora bearing still fewer traces of yellow than in ab. *tenebrioniformis*; exceedingly rare, only from the Grisons at an altitude of about 7844 ft. — The egg is elliptical, dark red. Larva 4—5 cm long, convex, flat beneath, yellowish white, bearing single small hairs, the dorsal vessel shining through as a dark stripe; spiracles edged with brown; nuchal plate yellowish; head large, blackish brown. Biennial and lives until April—May between the wood and the bark of all kinds of Poplar (especially on Populus nigra), but also on Salix. It prefers the lower parts of the trunk and the larger roots, making under the bark tunnels which are several yards long and often extend far below the surface of the ground; sometimes large numbers in the same tree. The larva also feeds in the roots of very young Populus tremula, the tree being sometimes killed by it. The presence of the larva is easily recognised by the fragments of gnawed wood on the bark. It is full-fed already in the autumn of the second year and makes an elongate-rounded cocoon intermixed with the gnawed off bits of wood, the cocoon being usually found some centimeters below the ground, but occasionally up to 20 centimeter above it; some larva spin up at a distance from the tree in an isolated cocoon of earth. The change into a chrysalis, however, takes place the next spring, the pupa being long and dark red-brown with rounded anal end which bears a ring of 10—12 short but strong spines; the abdominal segments have on the upperside spines directed backwards. Emergence from the end of May until July, single specimens in August.

Ae. timur *Gr.-Grsh.* *timur.* Head and palpi with yellow hair mixed with black hair between the eyes. Collar black. Thorax blackish, posteriorly mixed with yellow. Patagia black with 2 yellowish spots laterally and 4 underneath the collar. Abdomen black with yellow belts. Legs yellow. Wings with the margins and veins dark brown. Fringes black-brown in the ♂, dark brown in the ♀, mixed with yellow in the anal portion. — Buchara (Hissar Mts.).

Ae. melanocephala *Dalm.* (51 a). *melanocephala.* Antennae yellowish brown, in ♂ with rather long pectination, thicker towards apex and base than in the other German allied species, in ♀ very thin towards base and with a dark suffusion before tip. Palpi black, only anteriorly yellow in the upper portion. No white bands in front of the eyes, the latter edged with yellow towards underside. Thorax and abdomen blue-black. Patagia with yellow border anteriorly and dorsally. On the metathorax a lateral yellow tuft. Segments 2—4 of abdomen anteriorly belted with yellow, 5 and 6 and in ♂ also 7 posteriorly, anal tuft mixed with yellow. Breast with yellow lateral spots. Legs orange-yellow, coxae and femora black, the former with yellow dots, the fore femur yellowish beneath. Fore and mid tibiae with black spots before apex. Forewing margined with brown, more broadly so in ♀ than in ♂, in the ♀ almost the entire apical area and a portion of the central area of the forewing being scaled. Cross-vein rather broadly dark brown dusted with yellowish red. The larger proximal portion of the costal and hind margins yellowish red. Distal border of hindwing very narrow. On the underside the borders and veins of both wings are yellow-scaled, and the cross-vein entirely yellowish red. — Probably very widely distributed with the food-plant, but on account of being local and its habits not yet known it has only been found in Germany, Bohemia, Lower Austria, Hungary, Northern Roumania, Spain (Albarrazin), Norway (Christiania), Central Sweden, Finland and North-Western Russia; but is also known from Sarepta, whence I lately received a fresh example. Larva bone-colour, with dark brown head, red-yellow nuchal plate, and yellow anal tergite. It lives in the trunk and branches of Populus tremula, in the first year between wood and bark (but also bores into the ends of dry branches), in the second year in long tunnels deeper in the wood. Pupation without cocoon at the end of the tunnel behind a hard pad, which is slightly spun on laterally. The larva usually selects for pupation injured parts of the tree or projections, or bores into a dry branch to near the exterior thin bark. For that reason it is easily obtained by collecting dry branches in the spring. It turns into a long, pale red-brown pupa the end of April or beginning of May. The moth emerges from the middle of June to the middle of July, in the early hours of the morning.

Ae. pimplaeformis *Oberth.* (= maculiferum *Stgr.*). *pimplaeformis.* Well characterised by the abdomen being laterally somewhat compressed and its last 4 segments being dirty yellow and bearing a large round black dorsal spot each. The 3 anterior segments are black-blue; the second and third laterally with thin yellow bands which become broader towards underside. Venter black, only the last segment anteriorly yellow. Antennae short, black, the apex with brownish suffusion beneath and the basal segment incrassate and yellow. Vertex and frons brownish grey. Palpi yellow, with black hair at the base. Thorax blue-black, with the collar narrowly yellow. Patagia with yellow spots anteriorly. Underneath the patagia and the end of the thorax there are 2 yellow tufts. Fore coxa extended yellow beneath; tibiae yellow or russet-red, with blackish tips; tarsi brownish. Margins of wings, veins and fringes as in *Ae. apiformis*, but brownish grey or light russet.

Forewing with yellow dot at the costal margin; cross-vein somewhat curved and its scaling narrower, nearly as in *S. crabroniformis*. The fork of the upper radial very short. — Only 2 specimens known, from Transcaucasia (Thartum) and Northern Syria (Akbès).

2. Genus: **Sphecia** *Hbn.* (1822).

Distinguished from the preceding genus by the proboscis being well-developed and veins 3 and 4 of the hindwing stalked. End-segment of the palpi longer. The tibiae, particularly the posterior ones, thickened by a long pelt of hair. The cross-vein of the hindwing less oblique in the North-Indian and Japanese species. — Type: *crabroniformis Lewin.*

crabroniformis. **S. crabroniformis** *Lewin* (51 a). Differs from *Ae. apiformis* in the yellow collar, the black unspotted patagia, the whitish or dark hair of the occiput, the uniformly reddish yellow tibiae, the narrower wing-borders, and the absence of the yellow costal spot at the base of the forewing. Antennae black. Palpi edged with brown on the outside. — More local, and only plentiful and more distributed in Great Britain. The area of distribution is restricted to the western half of Europe, comprising Germany, Switzerland, Bohemia, Syria, Austria, Hungary, Belgium, Holland and Great Britain; a questionable record also from Piedmont. The larva bone-colour, clothed with single short black hairs, especially on the sides. Head brown; stigmata not edged with black. Biennial, in the roots and trunks of Sallow (Salix caprea), in the first year between the bark and the wood, in the second year deeper in the wood. Pupation similar as in *P. tabaniformis* without cocoon in a dilated place at the end of the tunnel, the aperture being closed by a hard lid. Turns into a light brown chrysalis in April or May. The moth emerges from the middle of June to early August.

przewalskii. **S. przewalskii** *Alph.* Closely related to *S. crabroniformis*, the collar yellow as in that species but broader, the patagia black inside with a yellow border posteriorly. Abdomen as in *Ae. apiformis*. Legs as in *S. crabroniformis*, but the hind tibia with very long velvety black hair on inside. Wings similar to those of *S. crabroniformis*, but the forewing bears a yellow basal dot, which is paler and more sharply defined than in *Ae. apiformis*; the cross-vein of the forewing is much more nearly vertical to the costal margin than in *S. crabroniformis*. In the only known specimen from Corea a yellow tuft extends from the yellow collar over the thorax. — From the Ala-Tau, Tianshan, Kuldja district, and a somewhat different specimen from Corea.

flavicollis. **S. flavicollis** *Hamps.* Expanse 48 mm (♀). Wings with the narrow borders and the veins yellowish brown; costal margin and cross-vein of forewing orange. Antenna short, entirely black. Collar yellow. Meso- and metanotum with 2 yellow stripes, the metathorax mixed with yellow. Abdomen yellow, segments 1 and 2 black, 3, 4 and 5 with black apical margins, which are broadest on 5. Legs yellow; hind tibia with black apical spot on the inside. — According to Hampson it belongs to the genus *Sphecodoptera Hamps.* Skardo, Kashmir, 8000 ft.

contaminata. **S. contaminata** *Butl.* (51 b). Wings transparent, the margins and veins black with a brown tone. On the forewing the costal and hindmarginal borders as well as the discocellular bar striped with red distally. Cross-vein of hindwing widened in the anterior half by brown scaling. Body black. Frons glossy white. Palpi yellow, with the terminal segment black. Antenna of ♂ pectinated, above black, beneath red-yellow. Head margined with yellow laterally and towards underside. Prothorax, a dot at the outer edge of the patagia near the base of forewing, and a transverse spot on the metanotum are yellow. Segment 4 of abdomen almost entirely yellow above, segments 1 and 2 as well as the three last ones bear minute yellow irrorations at the hindmargins, which are however but little distinct and do not give one the impression of yellow belts. On the underside all the segments excepting the first have distinct yellow posterior margin. Anal tuft mixed with brown. Legs black, mixed with yellow; fore coxa yellow; fore tarsus yellowish brown on outside; hind tibia orange on outside. Expanse 37 mm. — Japan (Yokohama, Yezzo).

romanovi. **S. romanovi** *Leech* (51 a). Forewing transparent, brownish, covered with thick dark brown scaling along the margins and the subdorsal vein. Hindwing transparent, outer half brownish, irrorated with some rather darker scales. Fringes yellowish brown. In the ♀ the forewing more densely scaled. Antennae pectinated in ♂, simple in ♀, black with the ventral half reddish. Head and palpi light orange, with reddish markings. Collar reddish. Thorax black, the anterior third brilliant orange. Abdomen brownish orange, with 7 black belts. Fore legs orange, marked with red, the other legs dark brown with orange and red markings. Expanse 46 mm, length of forewing 18 mm. — Japan (Yokohama).

rhynchioides. **S. rhynchioides** *Butl.* (50 m). The smallest species of the genus; the forewing similar to those of *S. crabroniformis*, with very narrow brown margin; but the head and thorax entirely yellow, the latter mixed with black only on the posterior portion of the mesonotum and on the metanotum. The 3 first abdominal segments black with narrow yellow hind edges to 2 and 3, the 3 last segments golden yellow with the hind margins black. Hind legs yellow, mixed with black on the tibia. — Appears to be rare; not known to me in nature. Only from Yokohama (Japan); the larva in Oak according to Pryer.

scribai.

S. scribai *spec. nov.* (50 m). Herr Fritz Scriba has been so kind as to send me a ♀ of a large species from Japan which I cannot identify with any of the known Japanese species and appears to be new. As in *crabroniformis* the proboscis distinct and veins 3 and 4 of hindwing stalked; cross-vein of hindwing remarkably straight in position; end-segment of palpi very long and pointed, wings very long and narrow; forewing black at the base and orange beyond this patch, median band orange. Palpi and frons yellow; prothorax black, with yellow spots beneath. Antenna brown, red-brown on outside. Inner margins of patagia and hair-tufts of metathorax yellow. Abdomen denuded, apparently with yellow belts above on all the segments, segment 1 with very distinct yellow dorsal belt. On underside segment 2 with narrow belt, 4 with broad one and 5 and 6 almost entirely yellow. Anal tuft yellow. Legs ochreous; femora, tibiae and upper part of hind tarsi black on outside; hind tibia (less so also middle one) conspicuously spotted with black before the apex on the inside.

3. Genus: **Melittia** *Walk.* (1856).

Antennae in ♂ with fasciculate cilia, in ♀ non-ciliate; they are very thin at the base, strongly dilated before the tip and bear some small bristles at the apex. Palpi vertical and rather slender, the second segment rather strongly hairy. Tibia and tarsus of hind leg with the exception of the last 2 or 3 tarsal segments densely clothed with extraordinary long bushy hair, which probably aids the moths in keeping afloat in the air when it sucks at flowers. The proboscis well-developed. Anal tuft feeble. Contour and venation of wings nearly as in *Paranthrene*; in the hindwing vein 3 thrown off before apex of cell and 6 present. — Widely distributed in the Nearctic and Neotropic Regions, South and West Africa, the Oriental Region as far as Java and the Moluccas; only 3 species extend to Northern China, Japan and Kashmir and are to be considered forms of the boundary districts. — Type: *satyriniformis Hbn.*, from North America.

bombyliformis.

M. bombyliformis *Cr.* (= chalcidiformis *F.*) (51 a). Expanse 32—36 mm. Wings transparent, slightly yellowish brown at the base; fringes brown; longitudinal patch of forewing extending to the median band; the latter with a black vein-like projection into the cell; distal vitreous area composed of 5 partitions, narrowing towards costa. Forewing slightly covered with brown and grey scales. Head brown, thorax yellowish brown. The first two abdominal segments yellowish brown, the others black with narrow yellow hind margins; venter yellowish white. Breast and palpi yellow and white. Hind leg black, the hind tibia and tarsus with very long bushy hair which is yellow and brown on outside. — Distributed throughout India and Java, extends on Palearctic territory to Northern China and Japan (Yezzo, Nikko, Yokohama, Tsuruga, Satsuma: May—June).

kuluana.

M. kuluana *Moore* (51 a). Expanse 30 mm. The vitreous areas larger than in the other two species, only a narrow outer border remaining. The median band likewise narrower, with shorter projection into the cell. Hindwing without blue colouring at the abdominal margin. Head, thorax, collar and the first 2 abdominal segments olive-brown, the other segments black-brown, all segments above with narrow yellowish hind edges. Breast and venter yellowish white. Hind legs with long black bushy hair, mixed with some yellowish brown and yellow hairs on the outside of the tibia and tarsus. — Kulu, Kashmir.

eurytion.

M. eurytion *Westw.* (51 c). Expanse 24—30 mm. Black, the vitreous areas of the forewing similar to those of *bombyliformis*, and the middle band as in that species with a black vein-like projection in the cell. The outer hyaline area strongly narrowing costally, consisting of 5 partitions, of which the uppermost is very small and the lowest longest; the broad distal border with white scaling at the margin. Base and outer margin of hindwing black. Antenna yellow, above black in the first as well as the last third, with some white scales before the tip. Palpi whitish, clothed with blackish hair. Thorax olive-green; abdomen black-blue, with distinct silvery white belts. The tibia and tarsus of the hind leg black, with very long hair, outwardly with some brown hairs, the tibia with a whitish ring in the middle, and like the tarsi with some whitish hairs at the apex. — Japan (Yezzo, Nikko, Yokohama, Tsuruga: June), North India, Moluccas, Java.

4. Genus: **Paranthrene** *Hbn.* (1822) (Sciapteron *Stgr.*).

Palpi with the end-segment short, as in *Aegeria*, the second segment, however, clothed with long erect hair, especially in the ♂. Proboscis a horny spiral. Antennae with small bristles at the tip, in ♂ lamellate and bearing 2 rows of fascicles of cilia, the last fifth not lamellate and without cilia. Body considerably slenderer than in *Aegeria* and *Sphecia*: anal tuft present in both sexes, but much longer in ♂ than in ♀. Tibiae but slightly hairy, not thickened by pelty hair. Forewing somewhat truncate at the apex, narrower, and usually very densely scaled with the exception of the base. In the vitreous hindwing veins 3 and 4 distinctly separate from lower cell-angle, 5 closer to 4 than to 6, cross-vein less oblique than in *Aegeria* and *Sphecia*. — Type: *tabaniformis Rott. v. rhingiaeformis Hbn.* The fine West-Asiatic species which used to be placed near *tabaniformis* differ so much morphologically that they will be dealt with under another genus.

tabaniformis. **P. tabaniformis** *Rott.* (51 b). Forewing brownish black, only the proximal parts of the cell and of the hindmarginal area vitreous; small yellow dots at the base near the outer edge of the patagia. Body and antennae black; abdominal segments 2, 4 and 6, and in ♂ also 7 with yellow hind edges. In a ♀ from Greece the vitreous basal streak of the forewing is entirely absent. Distributed throughout Central and South Europe, northward to Finland and Lapland, southward to Sicily and Catalonia, eastward to the Ural and beyond it as far as Amurland and Mongolia (here probably in modified form), south-eastward to Asia Minor and Transcaucasia. — In the larger western portion of Southern Europe, and Illyria, Algeria, Asia Minor, Syria, Amurland, in North-Western Mongolia and China the species is represented by the form *rhingiaeformis.* **rhingiaeformis** *Hbn.* (51 b), which is distinguished by the forewing being covered with ochreous scaling and bearing a distinct reddish median bar, and by the antennae being yellow in ♂ and ochreous in ♀. Moreover, all the abdominal segments bear yellow belts, and the patagia are spotted with yellow on inside. Prothorax with distinct yellow spots; on the metathorax 4 small yellow spots. The spot on the patagia is very conspicuous, and the anal tuft predominantly yellow, only being black in the centre. Legs entirely yellow. This form almost has the appearance of a distinct species, but it is connected with the first-described form by transitions; for instance, in Central Europe also specimens of *tabaniformis* occur with completely yellow-belted abdomen (Saxony, Berlin, etc.). — Prof. Seitz found at Shanghai two very small ♀♀ of *rhingiaeformis* which have narrow yellow belts, with the exception of segment 4, which is almost entirely yellow. I call this interesting form *sangaica.* **sangaica** *form. nov.* (50 g). — *kungessana.* **kungessana** *Alph.* may also be regarded an advanced transitional form. The antennae in the ♂ blackish brown, in the ♀ yellowish brown. Forewing dirty yellow. All the abdominal segments with very narrow pale yellow, almost whitish edges. From Tashkent, the Ala-Tau, and Kuldja district, presumably also in the Pamirs and the neighboring districts. — Larva yellowish white, bearing single dark hairs, with dark dorsal line, and black-brown head and pronotal plate. Lives in swellings of small stems and branches of Poplar, especially Populus nigra and tremula, also in the stronger roots of young trees, in stumps of branches, and at the base of the trunk; but has also been bred from bushes of crippled Salix. Hibernates twice and pupates in May without cocoon, simply lying in a tunnel beneath the bark which is gnawed very thin; chrysalis yellowish brown. The moths emerge from the end of May until early August. Herrich-Schäffer caught the moth as late as September. The statement that the larva of *rhingiaeformis* had been found in *Ebulum humile* has not been corroborated.

vespipennis. **P. vespipennis** *H.-Schäff.* Almost half as large again as *P. tabaniformis*; blackish brown, with small rusty-red median spot and small vitreous wedge-spot near the hind angle. Head and thorax brown with pale yellow collar. Antennae reddish. Palpi yellow. Patagia with pale edges and a small pale spot near the base of the forewing. Abdomen brown, segment 1 with 2 small yellow transverse lines, segments 2 and 3 yellow, the following margined with bright rust-colour. Metathorax with yellow arcuate spots. Anal tuft brown, mixed with light hair-scales. Legs pale yellow, with yellow tibiae. — China.

ferale. **P. ferale** *Leech* (51 b). Forewing only transparent from the base to a little beyond centre, brown, with dispersed orange scales and purplish reflections. Hindwing entirely vitreous, opalescent, with narrow dark border. Underside of both wings iridescent. Head black. Palpi anteriorly yellow. Collar yellow. Thorax and abdomen black, the latter with a broad yellow belt on segment 4. Legs blackish; hind tarsus yellow. Larger than the two other Japanese species of the genus, and easily recognised by the broad yellow belt on the fourth abdominal segment. Expanse 43 mm (♂). — Japan (Yezzo).

bicincta. **P. bicincta** *Walk.* (50 k). Nearest to our *tabaniformis*; not known to me in nature. According to the figure of the type the forewing is somewhat broader, brown, at the distal margin black, the thorax black mixed with yellow, and the abdomen black bearing a narrow yellow belt on the second and fourth segments. Hind tibia blackish, the tarsi yellowish. — Japan (Nagasaki, June; Tsuruga and Shimonoseki, July; Yokohama).

regale. **P. regale** *Butl.* (51 b). Forewing black, streaked with copper-colour. Hindwing vitreous, with black veins. Beneath the forewing for the greater part orange, and the veins and border of the hindwing also orange. Body black; anterior portion of collar, the patagia, 2 longitudinal stripes on the thorax and 3 abdominal belts (of which the first is the broadest, being broadly continuous on the ventral side) orange-yellow. Breast and femora spotted with orange. Legs black. ♂ dorsally on each side of the last abdominal segment with a long black tuft of hair extending beyond the tip of the abdomen by one-third. — Japan (Yokohama; Satsuma, May; Nagasaki, May and June; Shimonoseki, July); Kiukiang.

flammans. **P. flammans** *Hamps.* Expanse ♂ 26, ♀ 31 mm. Forewing covered with orange and black scaling, the veins black. Hindwing transparent, the veins orange and black, distal margin and fringes black. Palpi, head and legs orange-yellow, with a few black scales. Antennae orange, in ♂ bipectinate. Collar and thorax black, the former as well as the patagia and the metanotum margined with yellow. Abdomen blue-black, each segment with a pale yellow belt. Anal tuft black and orange. — Murree; not yet found on Palearctic territory, only occurring near the boundary.

5. Genus: **Bembecia** *Hbn.* (1822).

Antennae short, pointed, without small bristles at the tip, in ♀ filiform, feebly notched, in ♂ bipectinate excepting the apex. Palpi small, clothed with long bristly hair, much stronger in ♂ than in ♀. Eyes relatively small. Proboscis very short, horny. Tibiae with tufts of hair at the apices. Abdomen stout narrowed at base, incrassed apically, very robust in ♀, slenderer in ♂; segment 3 above in centre with a conspicuous tuft of hair, a smaller one above on next segment. Anal tuft of both sexes short and broad, longer in the ♂. Forewing very narrow, veins 4 and 5 coincident, and 7 and 8 very long. Hindwing narrowed, with the cross-vein unscaled and directed obliquely outwards; veins 3 and 4 on a long stalk, 1a extending to the distal margin. — The moths fly at night and rest with the wings lying flat on the body. The larva is cylindrical, of even thickness, sparsely covered with minute hairs, and lives in Raspberry. — Type: *B. hylaeiformis Lasp.*

hylaeiformis. **B. hylaeiformis** *Lasp.* (52e). The exterior vitreous area of the forewing is sharply bounded distally. First and second segments of palpi black outwardly and at the tip. Segments 1, 2 and 3 of abdomen with narrow anterior yellow belt and 3 also with posterior belt; posterior margins of segments 4, 5, 6 and in ♂ also 7 almost with broad yellow belts of almost even width. Anal segment never entirely yellow. Anal tuft for the greater part yellow, sometimes the black colour preponderating. In specimens from Amurland the tuft is black with yellow centre, and in ♂ sometimes altogether black. Fore coxa black, only yellow at the base. Central and Northern Europe (with the exception of the Arctic districts, also not known from England and the Netherlands), northward to Saltdalen in Nordland, and Finland, southward to Portugal, Piedmont and Dalmatia, Asia Minor and probably from Kasan over Siberia to Amurland, having already been recorded from the last districts. The full-fed larva 25—30 mm long, whitish grey, bearing single small grey hairs, the head brownish yellow, some spots on the pronotum yellow, as is also the anal tergite; thoracic legs yellowish, prolegs with dark border. Hibernates once and lives until May or June in roots of Raspberry (Rubus idaeus), more rarely in Blackberry; after hibernation it moves into last years stalks, which easily break off when being shaken. Pupa brownish yellow, with flat head-point, two rows of small hooks on each abdominal segment and 6—8 small spikes at the truncate anal end. Moths from June until August, usually after the middle of July, rarely still early in September; flies at night.

pectinata. **B. pectinata** *Stgr.* (52f). Differs from *B. hylaeiformis* in the outer vitreous area of the forewing not being sharply bounded distally, the antennae having longer pectinations and a more pointed tip, and the palpi being almost entirely yellow. Abdomen dark, segments 1 and 2 without yellow colouring and this very slight, all the other segments with yellow hind edges, on 4, 6 and in ♂ also 7 the yellow borders usually remarkably broader than on the other segments. Anal segment entirely yellow in ♀. Anal tuft predominantly yellow in ♂ and entirely yellow in ♀. Anterior coxa almost entirely yellow. Femora black, with the inner edge yellow. Tibiae and tarsi red-brown, mixed with black. — Kentei Mts. and Southern Amurland, the end of July and early August.

fixseni. **B. fixseni** *Leech* (52f). Forewing partly vitreous, densely covered with reddish brown scales along the veins to the apex of the cell. Apex and the broad outer border deep leather-brown. Hindwing vitreous, with deep brown dark distal margin. Head black. Palpi yellow. Collar narrowly yellow. Antennae above blackish, beneath reddish. Thorax with the inner edges of the patagia and a spot above and another below yellow. Abdomen blackish, with 4 yellow transverse bands on the 4 last but one segments; anal segment entirely yellow; anal tuft reddish orange. Legs yellow. Forewing marked with reddish orange. Underside of forewing yellow along the veins and towards the apex. Hindwing irrorated with yellow along the outer margin. Expanse 42 mm. — Japan (Nikko, Oiwake, June, July). Placed by Leech into *Sphecia*, but appears to agree better with the species of *Bembecia*; not known to me in nature, perhaps only a synonym of *pectinata Stgr.*

odyneripennis. **B. odyneripennis** *Walk.* (50m) was described from Nova Scotia. Leech, however, records it also from Japan (Hakodate, August), which may be due to a confusion with some other similar species. The figure taken from the type renders a description unnecessary.

6. Genus: **Synanthedon** *Hbn.* (Sesia aut. pr. p.) (1822).

Slender moths with well-developed proboscis. Antennae incrassate before the apex, bearing small bristles at the tip, in ♀ notched and ciliated. Palpi slender, with short terminal segment, the basal segment hairy beneath. Anal tuft strongly developed in both sexes. Forewing always with 3 vitreous areas, of which the longitudinal area reaches at the inner margin to the median band or beyond it. The wedge-spot in the cell very large, and the outer vitreous patch consisting of several partitions. In the forewing veins 10 and 11 are parallel with the costal margin, 1 a distinct, with a short loop at the base, 1 b atrophied. In the vitreous hindwing the inner branch of the submedian vein is vestigial to the outer area, veins 3 and 4 on a short stalk, cross-vein oblique. — Larvae cylindrical, usually the thoracic segments slightly incrassate; bone-yellow, with single small hairs on warts; the head and pronotum brownish. They hibernate generally twice, and live in trees and shrubs. The pupae are slender. — Type: *vespiformis L.*

scoliaeformis. **S. scoliaeformis** *Borkh.* (51 c). Wings with the margins and veins black; forewing with very broad deep black median spot which projects basad. Stigma of hindwing rather conspicuous ending very thin posteriorly. Body black-blue. Palpi orange, black on outside. Frons with silvery white bands in front of the eyes. Antennae extended whitish yellow before the apex. Patagia yellow at the inner margin. Abdomen with narrow yellow belt on hind edge of segment 2 and a broad one on 4, the latter occupying the whole segment on the underside; the lateral margins of 1—4 with yellow scaling, 5 beneath partly whitish; hind margins of 5, 6 and in ♂ also 7 orange beneath. Anal tuft orange-yellow. Fore femur extended yellow on outside; mid and hind tibiae with a broad black-blue ring before the apex. Distributed over the greater part of Central and North Europe (with the exception of the higher North), from Western France to the Ural, southward to Piedmont and Southern Russia (Malmish), northward to Lapland and Finland, but local and not often met with, as the habits are but imperfectly known. Very rarely aberrant specimens have been obtained in which the transparent spaces are coffee-brown. — Larva cylindrical, dirty white, the dorsal vessel shining through red-brown, the pronotal plate yellowish brown and the head dark red; length 35—40 mm. It lives mostly in the lower portions of old trunks of Birch (Betula) which have thick bark, and here it is found between the wood and bark, being most frequent on damp ground. It hibernates twice, makes irregular tunnels and changes in a dense brown, elongate-oval cocoon which is made of gnawed bits of bark and inwardly densely lined with silk, the cocoon having a lid. Pupa yellowish brown, with thin head-point, and a belt of 6—8 spikes at the rounded anal end. The moths in June and July.

mesiaeformis. **S. mesiaeformis** *H.-Schäff.* (52 a). Near *spheciformis*, but distinguished at once by the white bands at the eyes. The moth, moreover, is much slenderer, the colouring of the body and wings darker, more nearly similar to that of *scoliaeformis*. Antennae extended yellowish white before the apex, rusty red below and on inside. Palpi golden yellow, black above and on outside. Patagia with golden yellow inner margin; on each side of metathorax a yellow tuft of hair. The yellow hind margins of abdominal segments 2 and 4 widened into a spot at the sides, the belt of 2 laterally continued on to the first segment, segments 4 and 5 of ♂ beneath entirely yellowish white; in the ♀ only segment 4 entirely yellow beneath. Anal tuft uniformly blue-black, at most slightly mixed with yellow beneath in the middle. Tibiae and tarsi golden yellow, the latter black-blue at the base and with a broad yellow ring near the apex. The ♂ especially remarkable for the abdomen being strongly compressed laterally. — Banat, Herzegovina, Southern and South-Eastern Russia and the adjacent districts of Siberia. The larva lives exactly like that of *scoliaeformis* in Alder (Alnus glutinosa) according to M. Standfuss.

spheciformis. **S. spheciformis** *Gerning* (51 c). Not so deep black as *scoliaeformis*. Median spot of forewing almost by one-half narrower and proximally not produced into a point. Abdominal segment 2 posteriorly with a narrow yellow belt which is widened laterally into a spot continued on to segment 1; segment 4 beneath with narrow yellowish white hind border which is widened laterally; incisions of segments 5 and 6 beneath often with yellowish scales. Anal brush uniformly black-blue, beneath not or only slightly mixed with yellow. Femora and tibiae black-blue; hind tibia beneath spotted with yellow; tarsi yellow. Distributed over Northern and Central Europe, Northern Italy, Bosnia, Roumania, Southern Russia, Ural Mts. (where I found the species on the wing by day in July 1908 in plantations of Alder), Siberia to Amurland. — The larva 30—34 mm long, cylindrical, somewhat flattened on both sides, yellowish white, the dorsal vessel shining through brownish, the head brown-red and the nuchal plate pale brown. It hibernates twice and lives in young and old trunks and shoots of Alder, but also in the tree-stumps. The young larva bores first at the foot of the trunk not very deep into the wood: later on it tunnels deeper towards the roots and then makes an upward tunnel in the stem ending under the bark, where it changes after hibernation in April or May into a light yellow chrysalis. The presence of the larva is easily recognised by the frass being thrown out and looking like tree-mould. The moths emerge from the end of May until July.

deserta. **S. deserta** *Stgr.* (51 c). Near *spheciformis*, but the distal vitreous area of the forewing narrower and the median band convex proximally. Frons with white bands in front of the eyes. Hindwing with the cross-vein very slightly incrassate only in the upper portion. Antennae only yellow before the tip in ♀, uniformly black in ♂. Only abdominal segment 4 above with narrow belt, which is whitish yellow in ♂ and yellow in ♀; segments 1 and 2 laterally with whitish yellow dots, 2 above in ♀ with vestiges of a yellow belt; segment 4 beneath in ♂ like the following segments almost entirely yellowish white, in ♀ yellowish. Anal tuft slightly margined with yellow. Fore coxa extended yellow on outside. Legs very pale only on the inner side, predominantly black on outside; hind tibia very slightly mixed with a paler colour at the base and apex; tarsi with a strong dark suffusion. — Amurland (early July).

bicingulata. **S. bicingulata** *Stgr.* (51 d). Similar to *spheciformis* and *mesiaeformis*, but the forewing narrower, with much narrower median band than in the former. Cross-vein of hindwing slightly incrassate by scaling only in the upper portion. Antennae above uniformly black-blue, first segment beneath yellow. Frons golden brown, with white bands in front of the eyes. Head with narrow yellow posterior margin. Palpi yellow, with the outer half black. Patagia with yellow inner border. Segments 4 and 5 of abdomen above with broad yellow belts, which are widest at the sides, segment 1 laterally spotted with yellow, 2 with single yellow scales at the hind margin, 4, 5, 6 and in ♂ also 7 entirely yellow beneath, only the last segment bearing some black in the centre. Anal tuft above yellow at the tip, beneath extended yellow. Legs black; fore coxa with broad yellow suffusion on outside; hind tibia yellow at the base and apex; tarsi nearly entirely yellow. Legs of ♀ predominantly yellow. — Amurland (late in July). In a ♀ before me from coll. Püngeler the longitudinal and wedge-shaped patches of the forewing are slightly suffused with brown, and the hind margin of the forewing is almost entirely scaled yellow.

hector. **S. hector** *Butl.* (51 d). Similar to *spheciformis*, but the antennae without white spot above, being uniformly black, and the frons bearing white bands in front of the eyes. Hind margin of head yellow beneath and at the sides. Thorax uniformly black-blue, without yellow stripes. Abdomen slightly striped with yellow on the sides of segments 1 and 2, segments 4 and 5 above with very thin yellow belts. Anal brush black-blue, slightly mixed with brown. On the underside segments 4 and 5 occupied by two broad, golden yellow, almost united stripes. Anterior coxa exteriorly yellow; hind tibia with a yellow ring in the middle and at the apex; tarsi yellowish grey. Wings narrower and darker than in *spheciformis*, with black-blue margins. Cross-vein of hindwing only incrassate by scaling in the upper half. The costal margin of the forewing dark, only the base being slightly pale in colour. — Japan (Yokohama, Oiwake).

tenuis. **S. tenuis** *Butl.* (51 c). Wings transparent, with the margins and veins black; beneath both wings with bronze-coloured costal margin. Body steel-blue. Collar and two thin abdominal belts silvery white. Palpi, anterior side of coxae, sides of breast, basal segment of abdomen and a ventral band silvery white. According to Butler allied to *annellata Zell.* — Japan (Yokohama, Oiwake).

unocingulata. **S. unocingulata** *spec. nov.* (51 d). Belongs to the relationship of *bicingulata Stgr.*, bearing like that species white bands in front of the eyes. But the antennae are uniformly black-blue, and the uniformly black-blue abdomen only bears a broad yellow belt at the apex of segment 4, which is continued across the underside. Palpi black, whitish on inside. Head beneath edged with white. Forewing with narrow black borders; median band one-half narrower than in *spheciformis*, the distal area also is narrower than in the latter species. Hindwing with very thin dark border; cross-vein slightly incrassate anteriorly. Legs black-blue, tarsi mixed with yellow; hind tibia with a yellow ring in middle and at apex. Anal tuft laterally slightly mixed with yellow. Expanse 24 mm. (1 ♀). — Japan.

sodalis. **S. sodalis** *Püng.* (50 g). Herr R. Püngeler has kindly lent the type for figuring and sent the following description: "Expanse 24 mm. Similar to *spheciformis Gern.*, but abdomen with a whitish belt on segment 4 instead of on segment 2, and dirty yellow underside. Antenna more strongly ciliate and without yellow, likewise the palpi and legs dark. — North Tibet: Kuku-Nor, 1 ♂ (Rückbeil)". Type in coll. Püngeler.

andrenaeformis. **S. andrenaeformis** *Lasp.* (51 d). This is the first species of a group of small forms whose larvae live likewise in trees and shrubs. *S. andrenaeformis* is especially distinguished from the following allied species by the absence of the white bands in front of the eyes, by the patagia not being edged with yellow at the dorsal margin, and the abdomen being ringed with yellow only on segments 2 and 4. Anal brush of ♂ orange-yellow in the middle and at the tip, in ♀ only strongly mixed with yellow at the apex. Abdominal segments 1 and 2 spotted with yellow on the sides. Abdomen of the ♂ distinguished from that of the allied species by being strongly compressed laterally; it bears a very long anal tuft and the segments 4—6 and the dorsum of 7 are glossy silvery white; in ♀ only the edge of segment 4 is broadly and that of 5 narrowly white or yellowish, 6 sometimes posteriorly also with vestiges of yellow colouring. Rarely are also in ♀ segments 4 and 5 entirely silvery white. Palpi whitish or yellowish, black on outside. Distal area of forewing with a reddish sheen. In (? ab.) **monedulaeformis** *Bdv.*, from Andalusia, the abdominal belts are paler yellow, *monedulaeformis.* the anal brush also being yellowish white. — From Great Britain, Belgium, Austria-Hungary, Bosnia, Carinthia, Switzerland, South-Eastern Russia and the adjacent districts of Asia, of Eastern Russia and Asia Minor. The larva lives in the small stems of Snowball (Viburnum lantana, rarely in V. opulus) according to Rothschild (Trans. Ent. Soc. Lond. 1906 p. 471). At the place quoted the habits, caterpillar and chrysalis are described in great detail. The larva bores a straight tunnel in the centre of the stems or branches of the food-plant, and pupates without cocoon at the end of the tunnel, which almost stands at a right angle to the central tunnel. The moths emerge from the middle of May until July.

rufibasalis. **S. rufibasalis** *Bartel.* Much smaller than *andrenaeformis* and like this without white band in front of the eyes. Palpi with bushy hair, yellow, exteriorly black. Body black-blue; hind edges of abdominal segments 2 and 4 narrowly yellow above. Anal tuft only beneath with yellowish middle stripe and feebly mixed with yellowish at the tip. Legs yellow, tibiae blackish; hind tibia only blackish at the base and apex. Antenna uniformly black. Particularly distinguished by the extended red-yellow colouring of the base of the forewing, which colour is also spread over the hind margin. Discal spot edged with vermilion exteriorly (on the underside also proximally). Costal and distal margins of forewing brown-black, with a golden sheen; marginal cells minutely golden yellow. Underside of wings almost entirely golden yellow on the scaled parts; costal margin of hindwing beneath orange-yellow, likewise the base. — Upper Engadine (Pontresina, July 16. 1905, 1 ♂ caught by me). Larva presumably in Salix.

aurivillii. **S. aurivillii** *Lampa.* Nearly allied to *rufibasalis* and like this without white bands in front of the eyes. Palpi black above and partly also outwardly. Anal tuft uniformly black-brown above and below. Femora and tibiae black with metallic gloss; only the tarsi and the tip of the hind tibia yellow. Easily recognised by the anal tuft and the legs. The abdomen, moreover, is said not to bear 2 yellow dorsal belts; but the statement cannot be verified, as the type is somewhat worn. These notes on the species were kindly sent me by Prof. Aurivillius, after I had been able to satisfy myself about the specific distinctness from *polaris* of the type in the Stockholm Museum. — Lapland.

flaviventris. **S. flaviventris** *Stgr.* (51 d). Similar to *cephiformis* and *tipuliformis*, but the hind margin of the head not yellow, and the thorax uniformly dark, without yellow edges to the patagia. Abdominal segments 4—6 entirely yellow beneath. Anal brush of ♀ striped with yellow at the sides. Antenna pale beneath. Median band of forewing rather broad, very oblique. Outer vitreous patch very narrow, oblique, its first partition extending farther distad; marginal area above only with a very feeble red tint. — Probably distributed over the whole of the North German plains, but hitherto only found in Mecklenburg (Friedland, Neustrelitz), Pommerania (mouth of River Peene), environs of Hamburg and Kiel, in Silesia (Kohlfurt), at St. Petersbourg and in the province of Oblonetz. The larva lives in the branches of a Salix with rough leaves (presumably Salix caprea), in or not far above slight swellings which recall the Saperda-gall on Populus tremula. It is usually found in branches about the thickness of a pencil or a little thicker, especially in shrubs growing on moors; but it has also been met with on wet meadows and even in bushes which grew on a sandy soil. The best time for searching is April, when the shrubs are still without leaves. Pupation in June, the head of the pupa directed downwards. The moths emerge in June and July.

tipuliformis. **S. tipuliformis** *A.* (= spuleri *Fuchs*) (51 d). The best known and most widely distributed species of the genus. Head with yellow posterior margin. Patagia dorsally edged with yellow. Abdominal segments 2, 4, 6 and in ♂ also 7 with yellow belt on upperside; beneath segment 4 with yellow hind margin, while 5 and 6 bear only some yellow admixture. Metathorax without yellow transverse spot. Anal brush uniformly black, at most in ♂ beneath very slightly mixed with yellow in the middle. The outer vitreous area with straight proximal edge; marginal cells filled in with red. Very rarely specimens are obtained in which the wing-membrane is brown; also examples with the anal brush yellow at the sides have been found. — Distributed throughout Europe together with the food-plant, northward to Lapland and Finland, but apparently not yet recorded from the Iberian Peninsula, eastward to Amasia, Cis- and Transcaucasia, Uralsk district and Siberia. Introduced with the food-plant into North-America and New Zealand. Larva slender, 20—30 mm long, whitish, with very thin small hairs. Dorsal line dark; head and thoracical legs brown; pronotal plate divided by a light brown line. It hibernates only once and lives chiefly in the branches of various species of Ribes (R. nigrum, rubrum, grossularia, alpina) feeding on the pith; more rarely in young shoots of Hazel (Corylus), in branches of Juniper and Evonymus europaeus: sometimes destructive in gardens among currants. Pupation usually in May or June, rarely already in April, the pupa being brownish yellow. The moths appear over a long period, emerging from May until early September. — The larvae feeding in Juniper are the *spuleri.* cause of goitre-like swellings on the branches; the moths bred from them are larger. The form **spuleri** *Fuchs* based on specimens obtained from Juniper does not show any difference from ordinary *tipuliformis* according to an examination of the type.

cephiformis. **S. cephiformis** *O.* (51 d). Larger than *tipuliformis O.* and easily distinguished from it by the yellow hair of the metathorax and by the anal brush. The latter is black in ♂, mixed with yellow medianly at the apex, in ♀ bright yellow, this colour more extended above than beneath, the tuft only being black at the base and sides. The marginal cells of the forewing very feebly suffused with yellow on the dark border. At the base of the forewing a yellow dot near the outer edge of the patagia, the spot, however, being sometimes invisible. Rarely occur ♀♀ with the anal tuft black above instead of golden yellow. Distributed throughout Southern, Central and Eastern Germany, Switzerland, Bohemia, Austria-Hungary, Dalmatia, Bosnia, Roumania, Greece, Kuban district, Transcaucasia, Pontus and Hyrcania. The larva is bone-white, biennial, and lives in the swellings and cancerous growths caused by the attack of the fungus Accidium elatinum on the trunks, twigs and larger branches of Abies alba, Picea excelsa and Larix europaea, and betrays itself by the frass. Usually a number occur in the same swelling; as many as 67 moths have been bred from a moderately large growth. The green swellings are best collected in April and May; the moths emerge produce from the end of May until early August; larvae collected one year old and bred in captivity very much dwarfed moths.

conopiformis.

S. conopiformis *Esp.* (51 d). Similar to *tipuliformis*, but the cells within the dark outer border of the forewing filled in with brilliant reddish brown or coppery read above and below; this coppery colouring spread over the outer half of the hind margin. Discal spot relatively narrower, concave on distal side. Palpi brighter, orange-yellow. Metathorax with a yellow transverse spot. Differs from *cephiformis* in the absence of the yellow spot on the patagia near the base of the forewing and in the anal tuft being uniformly black-blue in both sexes. Fore coxa more orange-yellow on outside, in the other two species mentioned more yellow. Always larger and more robust than *tipuliformis*. — Germany, Switzerland, France, Belgium, Austria-Hungary, Dalmatia, Northern and Central Italy, Sicily, Southern Russia, South-Eastern Russia and the adjacent districts of Asia, Transcaucasia and North Persia. Larva whitish, cylindrical, flattened towards both ends, sparsely clothed with short erect small hairs. Dorsal vessel shining through dark. Stigmata black; below them a diffuse yellowish longitudinal stripe. Pronotal plate light brown; head brown, anteriorly black. Biennial, under the bark of old diseased or dead Oak, where the bark is split or in cancerous swellings, making many curved or irregularly shaped tunnels, which are very large as compared with those of other species. The larva has also been found in Lower Austria in the stem of the Mistletoe (Viscum album) near the base of the plant. Pupation from May until early July in an ovate cocoon made of gnawed wood. The moths emerge from June to August, rarely still in September, in favourable years already in May.

vespiformis.

S. vespiformis *L.* (= asiliformis *Rott.*) (51 e). Median band of forewing bounded by red-lead colour on outside, but usually entirely of this colour, which extends distad along the costal margin; marginal border rather narrow above, black-brown, in ♀ brownish. At the base of the forewing a yellow spot. Head black, with white bands in front of the eyes, and yellow collar. Patagia with yellow inner edge. Abdomen above with yellow belts on segments 2, 4, 6 and in ♂ also 7; 5 not rarely with an additional feeble yellow belt. On the underside segments 4 and 6, in ♂ also 7, posteriorly edged with yellow. Anal brush black-blue in ♂, beneath yellow medianly at the apex and at the sides; in ♀ broader and above golden yellow with a small black line in the centre at the base, beneath black with only the tip yellow. On the metathorax a yellow spot. Femora and tibiae yellow; the mid and hind tibiae with broad black subapical ring. — From Southern Sweden, Finland. St. Petersbourg, and England throughout Central and South Europe, North-Western Africa, Kuban district, Transcaucasia, and Asia Minor. — Specimens in which the forewing is entirely bordered with red, apart from the veins in the distal marginal border, are ab. **rufimarginata** *Spul.*, Rheingau (Bornich). — ab. **melliniformis** *Lasp.* is a questionable smaller form with pale golden-yellow colouring of the distal border to the forewing and without yellow inner edges to the patagia; moreover, the discal spot of the forewing is predominantly black, with thin golden yellow border on the outside; femora and tibiae black-blue, the latter yellow at the base and on the outside; tarsi yellow, black at the apex; from Saxony, Lower Austria, Southern France and Spain. May and June. — **codeti** *Oberth.* (= puigi *Oberth.*) (51 e) is a very small form from Algeria. A ♀ before me from Philippeville (May 6. 1906) is slenderer than Central European specimens, with the antenna relatively very thin. The outer vitreous patch much more irregularly convex outwardly. Costal margin scaled dark brown, with feeble yellow intermixture. Collar dark. Metathorax with very strong yellow tuft. The yellow belt of the fourth abdominal segment very strongly widened at the sides, segments 4—6 entirely yellow on underside. Anal brush dirty yellow, black above at the base. apex and sides; beneath black, medianly mixed with yellow at the apex. Legs dirty yellow, femora ringed with black. — Larva 20—30 mm long, bone-colour, strongly transparent bluish grey, especially on the back, minutely dotted with black and clothed with thin hairs. Head dark brown, anteriorly bordered with black. Pronotal plate and anal tergite brownish yellow, the former darker, pencilled with brown. Thoracical legs light brown; prolegs beneath ringed with brown. It is annual and lives in the stems of Oak between the bark and wood, often numerous in stumps, but also in rough swellings and cancerous growths of old trunks. Hibernates in a slight web, which it usually leaves in April in order to made a harder cocoon from particles of wood deep in the crevices of the bark. Singly also found under the bark of Chestnut (Castanea sativa), in Walnut and Beech (Fagus silvatica); at Malaga also observed in Tamarisk (Tamarindus). Pupa yellowish brown, with a spike on the head and 2 rows of spikes on each abdominal segment; anal end truncate, with a belt of 6—8 small spikes. The moths emerges from April to September, usually from June until early August.

rufimarginata.
melliniformis.
codeti.

myopaeformis.

S. myopaeformis *Borkh.* (51 e). Forewing with the margins and veins black and the vitreous areas large; outer area with a slight brown-red sheen. Antennae uniformly black. Above eyes a white stripe. Palpi of ♂ black exteriorly, white on inside, in ♀ entirely black. Abdomen with a red belt on segment 4, which is open beneath in the ♀; in ♂ underside of segments 4—6 (often also 7) occupied by a silvery white stripe. Anal brush black-blue, in ♂ beneath yellowish in the middle. Legs black-blue; tarsi of ♂ beneath dirty yellow, of ♀ brownish. Throughout Central and Northern Europe (northward to Christiania) with the exception of the Polar countries, also found in the Pyrenees, Northern Italy, Dalmatia, Roumania. Bulgaria, Greece, Southern Russia. Kuban district, Transcaucasia and Northern Asia Minor. *graeca.* In Greece occurs a form in which the outer area of the forewing is golden yellow and the abdominal segments 2 and 3 are more or less dusted with red: **graeca** *Stgr.* *elegans.* A larger Syrian form, **elegans** *Led.* (50 g), which has also been found in Egypt and Spain, is distinguished by the wing borders being broader and their scaling darker, particularly the outer border of the forewing broader and the scaling on the cross-vein of the hindwing stronger; the larva of this form in Egypt also in Apple-trees. — Larva 18—24 mm long, light wax-yellow or whitish grey, with a reddish suffusion; the dorsal vessel shining through reddish, the sides bearing single thin dark small hairs. Stigmata black. Head and pronotal plate dark brown-red. Lives under the bark, more rarely in branches, particularly in Apple (Pirus malus), more rarely Pear (P. communis), Mountain Ash (P. aucuparia), Cherry (Prunus cerasus), Plum (Prunus domestica), Apricot (P. armeniaca), and also in Hawthorn (Crataegus), chiefly in sickly trees in cancerous places, between the bark and wood. It is an annual, and throws out but little or no frass; pupation from the end of April until the end of June in a slight cocoon made of gnawed bark; the chrysalis long and brownish yellow. The moths appear from the end of May until the end of August.

uralensis. **S. uralensis** *Bartel* (52 b). Similar to *myopaeformis*, but without the white bands in front of the eyes and a narrower median spot on the forewing; the costal margin of the forewing yellowish beneath. Antennae uniformly black. Palpi black, yellowish on inside. Abdominal segment 4 red above and beneath; the last 3 segments likewise red beneath, the colour decreasing in intensity posteriorly. Anal tuft (♂) black, laterally at the apex mixed with with red-yellow, beneath red-yellow. Legs black, tibiae and tarsi with broad yellow rings. Distinguishable from *culiciformis*, apart from the different palpi, by the abdomen, anal tuft and the absence of red scaling at the base of the forewing. — Uralsk, middle of July, 2 ♂♂.

talischensis. **S. talischensis** *Bartel.* Expanse 21 mm, length of forewing 10 mm (♂). Of the size of *S. culiciformis*, but somewhat more broad-winged and of stouter build. Forewing with the borders and veins deep black, without red colouring at the base. The median spot almost twice as broad as in *culiciformis*, and proximally somewhat oblique. The outer vitreous patch very large, the upper partition not shifted basad as in *culiciformis*, the outer edge of the vitreous patch therefore being straight. The marginal area broader, entirely black, without the coppery sheen of *culiciformis*. The fringes of both wings also darker than in that species, likewise the narrow border of the hindwing and the much stronger central lunule. On the underside of the wings the sealed parts black, only the costal margin of the forewing and the very thin costal margin of the hindwing are slightly yellow. It is noteworthy that the outer margin is dark in this species and the colouring of the costal margins not inclines towards red. Body black. Palpi red, black on outside. Antenna (broken in type) somewhat stronger than in *S. culiciformis*, with rather longer cilia, above slightly lighter before the tip. Abdomen with the red belt much narrower and not dilated at the sides; moreover, the red lateral streak is absent from the anterior segments. Legs black, only the tarsi irrorated with dirty yellow; hind tarsi with a but very slightly prominent yellowish ring at the base. Breast with red lateral spot. Anal tuft very long, particularly laterally. *S. talischensis* is a very peculiar species. It agrees neither with *culiciformis*, from which it differs in the absence of the red colouring at the base of the forewing, in the broad median spot of the same wing, the antennae bearing a white spot before the apex, etc., nor with the other species with red belt and red-spotted breast. The red palpi with black stripe and the white-spotted antenna distinguish the species easily from *S. luctuosa* and *duplex*. The former character at once separates the species from *S. myopaeformis* and *pipiziformis Led.*; the very narrow simple abdominal belt and uniformly black anal tuft are good characters distinguishing it from *S. typhiaeformis* and *cruentata*. It is separated from *S. uralensis* by the red palpi, the broad median spot of the forewing, the uniformly black anal tuft, etc. *S. myopaeformis*, *luctuosa*, *typhiaeformis*, *cruentata* and *pipiziformis*, moreover, have white spots in front of the eyes. — Transcaucasia (Lenkoran, June 30. 1897, on Alder, collected by Korb). Type in coll. Bohatsch, Vienna.

luctuosa. **S. luctuosa** *Led.* Allied to *myopaeformis*, but the blue black borders of the forewing very broad, and the vitreous patches consequently very small. Outer vitreous area strongly reduced, rounded, composed of 3 partitions only; transverse band of forewing twice as broad as in *myopaeformis*. Hindwing always with an extraordinarily broad outer border and on the cross-vein with a thick spot of even width. Palpi steel-blue. The red belt of abdominal segment 4 does not reach so far on to the ventral side as in *myopaeformis*, and segment 6 is always dark beneath in the ♂. Anal tuft and legs steel-blue; tarsi with light-coloured rings in the ♂. — North-Western Asia Minor (Brussa), Smyrna, Cyprus, and Syria, in June; questionably also at Constantinople.

duplex. **S. duplex** *Stgr.* Similar to *luctuosa* and like that species with the black borders of the forewing broad and the vitreous patches small; the longitudinal vitreous patch absent and the wedge-spot strongly reduced. Outer vitreous area only containing 3 partitions. Outer area with some pale scales. Distal margin of hindwing not broader than in *myopaeformis*, but the bar of scales on the cross-vein broader. Body black. Palpi with long and rough hair. Abdomen above with the entire segment 4 and the greater portion of 6 yellowish red. Beneath only a few red scales in the dark ground at the apex of segment 4 or at the sides of 5. Anal tuft and legs black; fore tibia reddish yellow on inside; tarsi mixed with light scaling; tibiae of hind leg with conspicuous red hair excepting a short basal portion. — Samarkand (♀).

albanica **S. albanica** *Rebel.* Near *luctuosa* and *duplex Stgr.*; but the abdomen stout and above and beneath entirely uniform black-green. Antennae black, with long cilia, brownish on inside. Palpi uniformly black-green, the middle segment with long bushy hair. Anterior margin of eyes yellowish white. Legs uniformly black-green. Longitudinal vitreous spot of the black-brown forewing extending to the broad median band, outer vitreous patch oval, traversed by 3 veins; otherwise no light scaling on the forewing. Fringes paler. Cross-vein of hindwing without scaling, the other veins and the distal margin brown-black, likewise all the wing-margins on the underside. Expanse 19.5 mm. — Albania (Kisbarda near Valona, early June).

typhiaeformis. **S. typhiaeformis** *Borkh.* (52a). The forewing with blue-black margins, the distal border having a red-brown tone. Cross-vein of hindwing slightly incrassate. Body black-blue. White bands in front of the eyes. Palpi black above and at the sides, reddish yellow beneath. Antennae white above before the apex. Abdomen above with a narrow red-yellow hindmarginal belt on segment 2 and a broader one on 4, on underside a similar but whitish belt on segments 4 and 5. Anal brush black-blue, in ♂ whitish beneath in the centre; in ♀ uniformly black-blue. Legs black-blue; tarsi blackish above, whitish yellow or grey beneath. Abdomen of ♂ strongly compressed laterally. — Rather sporadic and rare; only known from South Germany (Augsburg, ? Frankfort o. M.), Lower Austria, Dalmatia, Northern and Central Italy (southward to Naples and Taranto) and France (northward to Paris). The larva lives in the branches of Apple-trees, particularly in the lowest branches. Moth in June.

cruentata. **S. cruentata** *Mann* (52 a). Differs from *typhiaeformis* particularly in that the abdomen bears red scales, which however do not form sharply defined belts; segments 1—4 above almost entirely red, 1 and 2 bearing black scales in the centre, almost condensed to spots. However, the red scaling varies somewhat in extent, sometimes only segments 1 and 2 having red spots above, while the other segments bear only sparse red scales. The sides of segments 1, 2 and 4 are striped with red. Venter uniformly black. Anal tuft slightly pale yellow beneath in the middle. Palpi blue-black, rusty yellow beneath on segments 1 and 2. Antennae a beautiful yellowish white before the tip. Distal margin of forewing black-brown, with a reddish tint; the median spot rather broad, black. Legs black; tarsi mixed with yellow. — Sicily (May, June). Larva in Apple-trees.

pipiziformis. **S. pipiziformis** *Led.* (52 b). Antenna likewise with a white spot before the apex, but the palpi white beneath and black above. The lateral edges of all the abdominal segments, and segment 4 above, a narrower dorsal border to the tail, as well as a thin median line in the tail on the underside orange-red or pale golden yellow. Eyes with pale golden yellow border. Legs steel-blue; tibiae yellowish white on the inside at base and apex and along the whole outside, tarsi likewise yellowish white. The ♀ is more compact and stouter, with the median band and outer border of the forewing broader, and the outer vitreous patch smaller and more rounded. Anal brush black above and below. — Syria (Beyrut, in the spring) and Southern Taurus.

culiciformis. **S. culiciformis** *L.* (51 e). Costal and hind margins of forewing above red beyond the base. Palpi red-yellow, black on outside. Antennae uniformly black. Frons with white bands at the eyes. Segment 4 of abdomen with a red belt which is of equal width above and below, segments 1 and 2 with red-yellow lateral stripe. Legs black-blue; tibiae yellow on inside, tarsi also yellow. Breast with a large red-yellow lateral spot. Anal tuft black, often with whitish hair at the very tip. In rare cases the wings are luteous on the upperside. The following aberrations have received names. *biannulata.* a) ab. **biannulata** *Bartel*, with an additional red belt above on segment 2. *triannulata.* b) ab. **triannulata** *Spul.*, with a further red belt above on segment 5; forms similar to *biannulata* also known from the Kuku-Nor and Ussuri (coll. Püngeler). *flavocingulata.* c) ab. **flavocingulata** *Spul.*, with all the red colouring replaced by yellow, which is especially conspicuous on segment 4; this form commoner locally in England. *thynniformis.* d) ab. **thynniformis** *Zell.* has likewise a yellow belt on segment 4, but also the other segments have yellow hind margins, the collar and upperside of the antennae being also yellow, the distal area of the forewing bearing yellow streaks and the anal tuft being luteous with steal-blue streaks; only known from Silesia, Mark Brandenburg, and Darmstadt. — *S. culiciformis* is distributed with the Birch all over Europe, extending northward to Alten, Nordland, Lapmark, Finland, southward to Spain, Piedmont, Croatia, Dalmatia, Servia, Bulgaria, Roumania, South Russia, Transcaucasia, and reaching from the Ural and Volga districts over Siberia to the Kentei Mts. and Northern China. Larva whitish grey or whitish yellow, with yellowish brown pronotum and light brown head. It feeds in the trunks and stumps of Birch under the bark, but also in younger shoots, more rarely in the wood of Alder, but also in the branches and suckers of young Aldertrees. It changes after hibernating once into an ochreous pupa in April or May. The elongate cocoon is somewhat impressed in the centre; it is not granular as in the other species, but covered on outside with thin long particles of wood, such particles also being found in the tunnel between cocoon and orifice. The moths from May to July.

stomoxyformis. **S. stomoxyformis** *Hbn.* (51 e). Considerably larger than *culiciformis.* Forewing not red at the base.

with a large outer vitreous area divided into 5 spots. The cross-vein of the hindwing considerably more incrassate. No white borders to the eyes. Palpi black-blue. Patagia red inwardly. Abdominal segment 4 entirely red above, the sides of 5, 6 and in ♂ also 7 are spotted with red; beneath the last 3 (in ♂ 4) segments red. Anal tuft of ♂ with lateral yellowish stripes. Breast without red spot near base of wings. Legs blue-black, tarsi yellowish. Distributed over the greater part of Central Europe, North Italy, South France, Spain, Portugal, East Rumelia, Volga and Ural districts, Transcaucasia and Asia Minor. — In the latter country, in Syria and *amasina.* North Persia it is represented by the form **amasina** *Stgr.*, in which the proximal vitreous spots are reduced, the outer vitreous area consists of only 3 spots and the dark scaling on the cross-vein of the hindwing is broader. Moreover, the belt of the abdomen is orange-red above, dirty yellow beneath, similarly coloured atoms being present on segments 5 and 6 on underside. More rarely is the belt the same colour all round, spreading over the underside of segments 5 and 6. — Larva in Medlar (Mespilus germanica); moth from May to the end of July.

velox. **S. velox** *Fixs.* (51 e). Differs from *stomoxyformis* in the narrower median band of the forewing, in the cross-vein of the hindwing only being scaled in the upper half, the band of the forewing being scaled golden yellow beneath, the palpi white-hairy with the first segment entirely white, the second blackish on the upper portion of the outer side, and the third entirely black. Further, the eyes are bordered with white anteriorly; segments 4 and 5 of abdomen are red; the anal brush shorter, red mixed with blackish; legs with green sheen, the rings on the tibiae and tarsi as well as the spurs white. Expanse 26 mm. — Corea (Pung-Ting, middle of August).

polaris. **S. polaris** *Stgr.* Abdomen uniformly black without coloured belt. The outer vitreous patch of the forewing traversed by 4 veins, being higher than broad. Distal border of hindwing narrow, black. Palpi black, yellowish red on inside and beneath. Antennae blue-black, exteriorly and anteriorly with a very slight yellow suffusion. The last abdominal segment beneath and the anal tuft on the sides with long yellowish red hair. Breast with some red scales on the sides. Tibiae yellow on inside; tarsi almost entirely yellow. Costal margin, median band and outer border of forewing brownish black, hind margin entirely reddish; above the outer vitreous patch a red streak and on the outer border reddish scales. Cross-vein of hindwing anteriorly much thicker than in *culiciformis*. On the under surface the costal margins of both wings extended yellow-red, the outer area of forewing with 6 yellow-red small wedge-streaks, and the veins of hindwing suffused with yellow-red. — Hitherto only found in Central Norway (Dovrefjeld), Lapland (Lule), Kuusamo and Pohjois-Pohjanmaa (Finland) and in the Kentei Mts.; but probably distributed over the whole of Northern Europe and Asia. The larva is said to feed in Dwarf Birch (Betula nana).

formisaeformis. **S. formisaeformis** *Esp.* (51 f). Median band of forewing black, with a thin brown-red outer border. The whole outer area a beautiful brown-red, costal and hind margins dusted with brown-red. Antennae black. Frons with white bands before the eyes. Palpi red, black on outside. Abdominal segment 4 above entirely red, 5 partly so; beneath, segments 4 and 5 entirely and 6 partly red. Anal brush with whitish stripes on sides in ♀; in ♂ yellowish, the apex of the lateral portion yellowish beneath mixed with yellowish. Breast without coloured spot. Legs black, tarsi yellowish, mid tibia with one and hind tibia with two whitish yellow rings. — Distributed throughout Europe (excepting the Polar countries), Central Ural, Asia Minor, Transcaucasia, Siberia to Amurland. Specimens from the Lena district (Ytyk-haja, July 5) have the distal border of the forewing blackish. Larva whitish yellow, on the abdomen with feeble longitudinal line shining through, on the last segment two wart-like tubercles each of which bears a small hair, and on each side with 3 rows of thin short hairs placed on granules. Head red-brown, pronotum paler, the former with bristly hair. The outer margin of the mandibles forms a portion of a circle, the inner margin bearing before the apex 3 triangular teeth of equal size. On the anal legs a brownish spot. Lives until May in the low stumps of cut-down bushes of Salix, especially in the stumps of osiers cut the year before, up to 2 feet above the ground, and also in the stems and branches entirely dwarfed bushes of Salix. Hibernates once and turns in April or May in the tunnel into a yellowish brown pupa. The moth from May until August, chiefly in June. The larva, according to Gross and Sorhagen, also lives in the goiter-like swellings of the younger trees and branches of Sallow (Salix caprea) in sunny localities; but it is has not been ascertained if the abnormal growths are due to the larvae.

serica. **S. serica** *Alph.* (50 g). Distinguished from *formicaeformis* by the uniformly coppery red median band of the forewing. Distal border narrower than in the previous species. Fourth segment of abdomen entirely coppery red, third segment with slight red scaling. Yellow colouring of hind tibia stronger and brighter. — Kuldja district, end of May, 1 ♂ at Kunges, 4000 ft. 1 ♂ and 1 ♀ from Uralsk (June) agree well with the original description, only the red belt occupies ventrally segments 4 and 5; these specimens are smaller, 17—18 mm, and conspicuously red at the base of the forewing.

nihonica. **S. nihonica** *spec. nov.* (50 g). Herr Fr. Scriba has kindly sent me for description a ♂ and a ♀ which has a different facies from the other known species of this genus and are doubtless closely related to the Indian genus *Ichneumonoptera Hamps.* However, vein 2 of the forewing is not absent in them, but approaches 3 very closely. Palpi with the end-segment long and pointed. Antenna of ♂ with short cilia. Hind tibia of ♂ rather strongly hairy. Anal tuft very long, in ♂ very strongly pointed and folded together. Veins 7 and 8 forewing on a long stalk, 3 and 4 of hindwing on a short one. The species represents perhaps a separate genus which would be best placed near *Synanthedon*. Proboscis a very long spiral. Vitreous areas of forewing very large, outer vitreous patch consisting of 5 spots; median band of forewing very narrow, yellow on distal side. Eyes with broad white anterior borders. Frons, vertex, inner edges of patagia, metathorax, hind margins of all the abdominal segments, anal tuft of ♂ and the legs yellow. Palpi also yellow, on outside thinly black. Antennae black, beneath ochreous, in ♀ above before tip with a yellow spot. Anal tuft of ♂ black, beneath yellow at apex, and sides with thin yellow stripes. Tibiae ringed with black. The abdomen of the ♂ is characteristic, being ventricose beneath, strongly compressed laterally and very strongly pointed. — Japan.

7. Genus: **Dipsosphecia** *Spul.* (1910).

Spuler was quite justified in erecting a new genus for the species allied to *ichneumoniformis*. He bases it particularly on the strongly atrophied or soft proboscis, whose reduction, according to Püngeler, doubtless indicates that the organs of digestion also are modified. A peculiarity of the species of this genus is the colouring of the median band of the forewing, this band being mostly bordered or spotted with red on the outer side, while the wing itself is sometimes orange-red, being entirely dark only in a few ♀♀; and it is further characteristic that the known larvae live in the roots of Papilionaceae, and that Central Asia is especially rich in bright-coloured species, so that many interesting discoveries may be expected from that region. The bright belts of the abdomen are nearly all continued over the underside. Veins 10 and 11 of the forewing approximate towards costal margin, but are not previously coincident. — Type: *D. ichneumoniformis F.*

D. palariformis *Led.* (51 f). The sexes very different; the abdomen of ♀ conspicuously narrowing posteriorly; veins 3 and 4 of hindwing not stalked. Forewing of ♂ with dark margins, very oblique dark median band and distinct vitreous patches, of which the longitudinal one does not quite reach to the median band. Fringes of both wings glossy grey-white. Cross-vein of hindwing broadly covered with dark scaling for its entire length. Antenna black, exceedingly strongly serrate and very strongly ciliate. Palpi with bushy hair, pale yellow, black on outside, end-segment long and pointed, yellow. Eyes with white anterior borders. Body black, thorax anteriorly and at the sides with rather long grey hair, posteriorly with some yellow hairs. Abdomen with a thin pale yellow belt on segment 2, broader ones on 4, 6 and 7; on underside 4 with thin yellow border and 5—7 with yellow spots laterally. Anal tuft black, beneath yellow in the centre. Breast without coloured spot below the wing-base. Femora black, tibiae and tarsi pale yellow, the former with black rings. The ♀ stouter, with the abdomen larger and very pointed. The forewing the colour of red lead, the costal and distal borders broad and black-brown; median band with broad proximal border and thin distal one of the colour of red lead. No vitreous patches, or only the wedge-spot and the outer vitreous patch indicated by the scaling being thinner, shining through. Hindwing as in ♂, but the veins scaled red and the inner margin extended red-yellow; cross-vein as in ♂ broadly covered with dark scaling, but with thin red border. Underside of wings red lead colour with the exception of the dark outer borders, the cross-vein of the hindwing and a thin bar on the cross-vein of the forewing. Palpi with very long reddish yellow hair, only the base being rather strongly black-hairy. Antennae without cilia, relatively short and thick. Frons and collar whitish. A large yellow spot on the patagia near the base of the forewing (only vestigial in ♂). Thorax uniformly black. Abdomen with broad yellow belts on segments 2, 4, 6. Breast uniformly black. Femora and tibiae orange. — Asia Minor (Amasia, June), Anatolia (Konia), Taurus, Syria (Damascus), Malatia, Mesopotamia. — A larger and more red form from Malatia has been separated as ab. **rubrescens** *Stgr.* *palariformis* *rubrescens.*

D. diocttriiformis *Rom.* A doubtful pecies, only one specimen known, from Southern Transcaucasia. Expanse 15 mm (♀). The facies is that of *palariformis*, of which it is possibly only a variety. The forewing, however, with little orange-red colouring, rather broad black margins and median band, the latter agreeing with that of *palariformis*. Fringes of both wings dark brown. Underside of wings with little orange colouring. Body blue-black; frons yellowish white. Antennae short and rather stout. Second segment of palpi ochreous, third also ochreous, with a little black on inside. Abdomen with 3 light yellow belts and black anal brush. Legs black, tibiae dirty yellow in the centre. — Differs from *palariformis*, of which it is probably only an aberrant ♀ or, according to Püngeler, a mere synonym, in the very broad black distal area of the forewing, the very broad distal border of the hindwing and the red base of this wing (the inner margin being dark), the much reduced red lead colour on the forewing, and the dark legs. *diocttriiformis.*

D. dispar *Stgr.* (52 a). The sexes of this pecular species are very different in colour and markings; it represents probably another genus, the very late appearance of the moth pointing in that direction. In the ♂ the forewing is vitreous, partly covered with small dark scales, the costal margin being broadly black and the veins blackish; hind margin pale yellowish; at the apex of the cell a narrow black band; costal margin *dispar.*

distally narrowly bordered with yellow. Antennae black, relatively much longer than in *Par. tabaniformis*, with short pectinations. Vertex black, mixed with yellowish towards underside. Frons glossy silver-grey. Palpi with very long hair, pale yellowish grey, blackish on outside. Thorax and abdomen black, the former with some light colouring. Abdomen with rough hair, segments 4, 5 and 6 with distinct yellow belts and segments 2, 3 and 7 posteriorly mixed with yellow; the yellow belts more obsolescent beneath. Anal tuft black, with slightly pale admixture. Legs dirty yellowish grey, mixed with blackish. The smaller ♀ is entirely different from the ♂, being almost completely black. Forewing deep black, entirely opaque. Hindwing likewise black, but the scaling rather thinner on the disc. All other parts of the body deep black, only the frons is glossy silver-grey in front of the eyes. Palpi not so rough-hairy as in ♂, above and on inside pale greyish yellow. — South Algeria (Biskra) and Tunisia (Gafsa). The species has been bred in October from larvae which were found in April in the roots of a Papilionaceous plant.

barbara. **D. barbara** *spec. nov.* Expanse 12 mm. Although I have before me only a single defective ♂, I describe it as a new species, because the characters present are sufficient to distinguish the insect from all the other species. This ♂ is stout and robust in build, black, with the antenna dentate and strongly ciliate, the palpi yellow and very slender, with the third segment quite unusually long and pointed, the frons dusted with yellowish scales, the vertex bearing long grey hair, and the hind margin of the head being yellow. Patagia with a white spot near the wing-base and apparently yellow inner border. On the metathorax a whitish tuft of hair. Abdomen with the margins of segments 2, 4, 5 and 6 narrowly white, the belts not being closed on underside, being here represented by lateral spots. Anal tuft black, beneath yellow centrally at the apex. Legs black, with yellow rings; hind tibia with yellowish middle spot. The forewing have large vitreous patches, the longitudinal patch being very long and the outer one consisting of 5 spots of which the 3 central ones almost reach to the distal margin and bear yellowish scales distally, while the other two spots are somewhat short. The broad median band is black, bearing a yellow spot distally. The longitudinal patch is edged with yellow posteriorly. The dark scaling of the margins slightly dusted with yellow. Hindwing with narrow brown border and black base; cross-vein broadened anteriorly, thin like a hair posteriorly. Proboscis atrophied. — In spite of the belts not being closed on the underside this robust and dark species is best placed among the allies of *ichneumoniformis*. It cannot be confounded with any other species. Algeria (Teniet-el-Had, M. Korb). Type in coll. Püngeler.

hymenopteriformis. **D. hymenopteriformis** *Bell.* (52 b). The sexes very different. ♂ somewhat recalling *uroceriformis*, but clumsier. Forewing brown-black, dusted with yellow atoms, the outer border golden yellow with a thin dark brown marginal line. Median band broad, dark brown, with a thin orange yellow outer border. Vitreous areas distinct, the two proximal ones small, the outer one broader than high, composed of 3 spots. Cross-vein of hindwing slightly incrassate anteriorly. Antenna black, extended yellowish before the tip, brown beneath. Palpi white on inside, with rough black hair on outside. Eyes anteriorly bordered with white. Hind margin of head yellowish. Thorax with dense yellow hair at the sides. Patagia with a white spot near the base of the forewing. Abdomen covered with yellow atoms: the segments 2, 4, and 6 with thin white hind borders, of which the second is continuous beneath and here very broad, while the following segments are spotted with white laterally. Anal brush black, with whitish stripes at the sides and in the centre; beneath entirely yellowisch in the middle. Anterior coxa white, blackish on inside. Legs golden brown, ringed with white and black. In the ♀ the forewing entirely dark brown, without pale scaling. The proximal vitreous areas absent, the outer one very small, rounded, composed of 3 small spots. Hindwing with the dark brown border much broader than in ♂. On the underside of the forewing the median spot has a thin yellow outer edge, otherwise the wing dark. Antenna dark brown, somewhat paler beneath. Frons white. Palpi yellowish, with black margin. Patagia with yellowish inner border; some yellow hairs on the metathorax. Segments 2, 4 and 6 of the black-brown abdomen with white hind borders, the belt of segment 2 not quite complete on underside, 4 and 6 spotted with white laterally on the underside. Anal tuft quite dark. Anterior coxa yellowish white. Legs black, femora with yellow streaks. — Sicily (July, at exceedingly arid localities), Algeria (neighborhood of Alger) and Tunisia.

parthica. **D. parthica** *Led.* Recalls *hymenopteriformis* by the great difference in the sexes. Forewing of ♂ with brown costal border and black median band, the latter distally spotted with orange-red; hind margin pale orange. Vitreous areas distinct; outer one large, traversed by 5 veins, pale golden yellow. Underside pale golden yellow with the exception of the black median band. Body black. Collar and lower part of palpi white-grey, the latter with black hair on outside. Antenna black, with long cilia. In front of the eyes a small white spot. Patagia with white inner edge. Abdomen bordered with yellowish white on both sides of segments 2, 4, 6 and 7, the belt of segment 4 the broadest. Anal tuft black, centrally yellowish above and beneath. Coxae yellow; femora and base and apex of tibiae black; hind tibia with yellowish rings. Differs from the ♂ of *hymenopteriformis* in the large outer vitreous patch, the black median band of the underside, the laterally not light-coloured anal tuft and the yellow coxae. The ♀, like the ♀ of *hymenopteriformis*, has the forewing almost entirely covered with brown-black scales, the vitreous wedge-spot being a mere vestige and the outer patch indicated only by thinner scaling. Head and palpi with yellow hair. Abdomen blue-black, segment 4 with a narrow yellow hind margin above and beneath, 6 only above. Anal tuft and tibiae entirely black. *D. hymenopteriformis*-♀ has on the second segment a distinct white hind edge which, like the other belts, is not continuous on underside. — *D. parthica* has only been found in Southern Transcaucasia.

D. himmighoffeni *Stgr.* (51 f). Much smaller and darker than *uroceriformis*, the longitudinal vitreous spot always wanting in both sexes, being replaced by yellow scaling; the hind margin is dark brown with a very thin upper border; median band predominantly dark brown, with narrow yellow outer border; the outer vitreous patch filled up with yellow, the 2—3 small vitreous partitions being but slightly visible. The distal margin of the hindwing broad at apex and gradually becoming thin towards anal angle, being brown above and dusted with yellow beneath. Antenna of ♂ dark, that of ♀ sometimes with a slight whitish spot; underside of antennae likewise black, which does not occur in *uroceriformis*. Head and palpi orange in ♀, the frons white; in ♂ black, posteriorly with whitish edge, the palpi bushy and black, with dirty whitish inner side. Thorax with yellow median line, inner edges of patagia also yellow. Abdomen with strong yellow bands on upperside with the exception of the first segment, beneath nearly as in *uroceriformis*. Anterior coxa blackish in ♂ mixed with whitish; in ♀ entirely yellowish white. Tarsi usually uniformly dark. — Catalonia, Prov. Teruel, Aragonia, Basses Alpes, Genoa, from June to August. *himmighoffeni.*

D. sirphiformis *Luc.* (51 f). Likewise nearly allied to *uroceriformis*, but the outer vitreous patch entirely filled up with yellow scaling or, in ♂, only the proximal portions indicated. Median band narrowly black with a broader yellow outer border. Outer marginal area golden yellow, bounded by dark brown distally. Hind margin yellow. Head and palpi as in *uroceriformis*. Antennae black, beneath brown-black excepting the apex, on outer side brownish or whitish, but without light-coloured spot on the upperside before the apex. Abdomen with yellow belts on all the segments with the exception of segments 1 and 3; the belts on 4, 6 and in ♂ also 7 broadest; the belt on 2 sometimes absent in ♂. On the underside the last 3, in ♂ 4 segments with broad yellow belts. Anal tuft yellow in ♂, black at the sides and beneath at the base; in ♀ black, above orange-yellow in centre. Fore coxa black, yellow on outside; femora and tibiae yellow, the mid and hind tibiae with broad black apical ring. — Algeria, in June. *sirphiformis.*

D. uroceriformis *Tr.* (51 f). Forewing narrower in ♂ than in ♀, the median spot orange with slight brown proximal border. Outer vitreous patch composed of 3—4 spots, of which the lower one is usually vestigial. Antenna of ♂ not rusty yellow on outside, uniformly black above, at most with a few golden yellow scales; in ♀ with a white, not yellow, spot before the apex, sometimes almost the whole upperside dusted with white. Abdomen with yellow belts on all the segments with the exception of the first, the anterior belt and the 3 or 4 posterior ones are not interrupted on the underside, the belts of segments 2, 4 and 6 are broader above than in *ichneumoniformis*, and the ♂-abdomen is slenderer than in that species. The yellow shoulder-spot of the patagia very distinct. In the smaller ab. **mamertina** *Zell.*, from Messina is Sicily, the median spot of the forewing has more black and less red-yellow, the hind margin of the forewing is brown with but little golden yellow dusting, and the belts are absent from segments 3 and 5. — **armoricana** *Oberth.*, from Brittany (Ille-et-Vilaine) and Western France, is larger, with the yellow colouring of the forewing more extended, the median spot more yellow than orange and in ♀ entirely yellow without dark proximal border. Head very strongly shaded with yellow. The white spot on the antenna of the ♀ very large and conspicuous, pure white. — True *uroceriformis* occurs in the Southern Tyrol, at Vienna, Prague, in Hungary, Dalmatia, Sardinia, Sicily, Granada, Prov. Teruel, Aragonia, Catalonia, Southern France, Corfu, Greece, Transcaucasia, Asia Minor and Syria, from June to August, rarely already in May. Larva in the roots of Dorycnium herbaceum (according to Pech). J. de Joannis observed the eggs being deposited on Ulex. *uroceriformis.* *mamertina.* *amoricana.*

D. rondoui *Siepi.* Expanse 16 mm. According to the author it comes near *uroceriformis*, from which it is distinguished by the abdomen being entirely blue-black above and by the anal tuft totally black with some ochreous hairs in the centre. The femora and tibiae are brownish, the tarsi ochreous with brownish tip. Forewing ochreous, the borders and median band brown-black, the latter not reaching to the hind margin. The wedge-spot and outer vitreous patch present, the latter curved and divided by brown-black veins. Hindwing with a small excision at the apex of vein 7 and fine brown border; spot on cross-vein rather strong, blue-black. Head and antenna brown, the latter pale beneath, the apex black-brown, anteriorly with whitish sheen. Proboscis light brown, length not known to the author. Basal and median segments of palpi abundantly clothed with brown scaling. Thorax brownish. — Described from a single specimen found early in June in the valley of Passe-Lemps (13 km from Marseilles) on flowers of Valeriana. On account of the (? distinctly) developed proboscis the species should be placed into *Chamaesphecia*. *rondoui.*

D. astragali *Joann.* Expanse ♂ 24, ♀ 26 mm. Closely related to *uroceriformis Tr.*, but the forewing of the ♂ narrower, black to vein 9, in ♀ black to vein 8. Outer margin yellow, hind margin yellow in ♂ and golden yellow in ♀. Cross-vein black, with broad outer border and narrower proximal one orange-red. Longitu- *astragali.*

dinal vitreous mark not reaching to the cross-vein, still shorter in ♀. Outer vitreous patch consisting of 4 spots. Hindwing transparent, the cross-vein scaled black anteriorly, the veins black with the exception of 5 and 1 b, which are more or less scaled yellow. Fringes black, but whitish at inner margin of hindwing. On the underside the borders are yellow with the exception of the portion above the median spot of the forewing, and dusted with black in [illegible]. Frons yellow. Antennae in ♂ black, in ♀ orange excepting the last two-fifths. Hind margin of head yellow. Collar black; thorax also black, with yellow posterior border; margins of patagia yellow for their whole length in ♂, particularly anteriorly in ♀. Abdomen above with broad yellow belts on segments 2, 4, 6 and 7, with narrower ones on 3 and 5; in ♀ with broad belts on 2, 4 and 6, and yellow transverse spots on 3 and 5. On the ventral side segments 2 and 3 have feebly yellow edges in ♂, and are quite black in ♀, while the other segments bear broad yellow belts excepting the first. Anal brush yellow in ♂, above black at the sides; in ♀ above yellow with the exception of the base, the side-tufts and under surface black, the latter sometimes with some yellow hairs at the apex. Fore tibia yellow dusted with black, fore tarsi yellow; mid and hind tibiae yellow, with the base and apex black, tarsi yellow, not ringed. — Apparently nearer to *ichneumoniformis*, but easily distinguished from it by the the median spot of the forewing being bordered with orange proximally and by the arrangement of the yellow abdominal belts. Larva in the roots of Astragalus monspessulanus; moth in July. Southern France (Bonde, dept. Vaucluse) and neighbourhood of Barcelona (Montserrat).

ichneumoniformis. **D. ichneumoniformis** *F.* (= vespiformis *Esp.*, systrophaeformis *Hbn.*, ophioniformis *Hbn.*, statuiformis *Frr.*) (51 f). The most widely distributed species of the group. All the segments of the black abdomen with the exception of the first with a yellow belt, the belts on 4 and 6 being broadest. Outer vitreous patch of forewing larger in ♂ than in ♀, consisting of 3—5 partitions. Longitudinal window always present, shorter in ♀ than in ♂, almost reaching to the median band in ♂. This band brown, distally orange. Hind margin orange. Antennae in ♂ distally suffused with yellowish brown, in ♀ entirely yellowish brown. Differs from *uroceriformis* in the vitreous longitudinal patch of the forewing being present in ♀ and much longer than in *uroceriformis* in ♂, in the antennae being distally suffused with yellow in ♂ and entirely yellowish brown in ♀ (the ♀-antenna of *uroceriformis* only bears a white spot before the apex), in the more robust build of the body and the different markings of the abdomen. Distributed throughout Europe with the exception of the Polar countries, occuring also in Mauretania, Armenia, Asia Minor, Syria, Palestine, Kasan, Uralsk, Western and Central Siberia to the Altai. Staudinger described a ♀-form with black abdomen from North-Western Asia Minor (Brussa): *lugubris.* ab. — ♀ **lugubris**. — **illustris** *Rebel* *illustris.* is very bright-coloured, especially in the ♀, and mostly larger, and occurs in Mesopotamia and Konia; the antenna of the ♀ is very vivid ochreous, and the abdomen bears belts of the same width on all the segments excepting the first. — The larva is bone-colour, thinly hairy, with black-marked head; length 20 mm. It hibernates only once, is usually full-fed the end of May and lives in the roots of Papilionaceae, e. g. Ononis spinosa, Anthyllis vulneraria, Dorycnium, Lathyrus pratensis, Lotus, Centaurea, Medicago, Hippocrepis, Melilotus, but not in Genista tinctoria. Makes a kind of hose close along the main root and provides it with a lid, pupation taking place in this hose. The moths emerge from May until August.

romanovi. **D. romanovi** *Bartel.* Expanse 27 mm (♂). Differs from *ichneumoniformis* in the basal half of the costal margin of the forewing being orange, the hind margin entirely orange, the median band uniformly orange and in the absence of scaling in the cells of the outer area, the outer vitreous patch extending to the distal margin. Moreover, the hindwing has hardly a trace of a dark border. Head entirely yellow; the antenna yellow with black apex. Abdomen blue-black, with segments 1 and 3 entirely dark and 4 entirely yellow, the other segments bearing much broader yellow hind edges than in *ichneumoniformis*. Anal tuft yellow. — Only 1 ♂ known; from Southern Transcaucasia (Kasikoparan, June).

megillaeformis. **D. megillaeformis** *Hbn.* (51 f). Distinguished from *ichneumoniformis*, apart from the outlines of body and wings, by the absence of yellow belts above on abdominal segments 3 and 5, by the uniformly blue-black upperside of the antennae of ♂ and ♀, the very small orange spot in the outer portion of the median band of the forewing and the different anal tuft. This brush is yellow above in the centre in ♂, black laterally and at the base, with 2 broad orange-red longitudinal stripes; black in ♀, slightly mixed with orange in the centre, with a thin orange-yellow lateral stripe beneath. On the ventral side of the abdomen only the belt of segment 4 is distinctly continuous, while none of the others are very distinctly united. Palpi in ♂ yellow, with long erect black hair on the outside of segments 1 and 2, in ♀ orange-yellow with lighter yellow sides. — The ♂ is very rare (only 1 ♂ bred among 30—40 ♀♀). In Saxony, Bavaria, at Wiesbaden, in Eastern Switzerland, Moravia, Lower Austria, Hungary, Southern France, Greece, Eastern-Central and South-Eastern Russia and the adjacent districts of Western Asia, Altai district and in the provinces of Jenisseisk and Irkutsk, from the end of June until the end of August. The larva lives exclusively in the roots of Genista tinctoria in sunny stations. It constructs as a continuation of the cocoon a rather long hose, much longer than in *ichneumoniformis*, in which species it is not often present.

lomatiaeformis. **D. lomatiaeformis** *Led.* Larger than *ichneumoniformis*, of almost the same facies. Particularly characterised by the whitish grey woolly hair which covers head and thorax. Forewing broader and more strongly rounded than in *ichneumoniformis*, with a small pale yellow spot at the base. Costal margin greyish brown, hind margin yellowish brown. The longitudinal patch almost reaches to the median band, which is broad, proximally greyish brown, distally buffish orange. The outer vitreous patch is very large and consists of 6 spots; therefore the grey scaling at the outer margin and apex much reduced, the outer-marginal border almost being absent. Palpi pale yellow, first and second segments exteriorly with long black bristles, third segment smoothly scaled. Antennae black, brown beneath at the base, in ♂ very strongly ciliated. Prothorax glossy steel-blue, otherwise of a peculiar white-grey colour, clothed with woolly hair. Patagia posteriorly with yellow hair. Abdomen blue-black, with a dirty yellow belt on each segment excepting the first, the belts on segments 2, 4 and 6 broadest, that on 3 only represented by a trace of yellow, all the belts narrower beneath. Anal tuft yellow, with 2 narrow black stripes. Femora blue-black and grey, with woolly hair; tibiae buffish yellow, black at base and apex; tarsi yellow. — Only known from Mesopotamia (Diarbekr) and Pontus (Amasia).

D. rothschildi *spec. nov.* (50 g). A very robust species, with the abdomen strongly cylindrical and pointed. *rothschildi.* Body and palpi with deep velvety black hair, the latter with strong hair on the outer side and extending above head by one-half. Frons variegated with whitish scales; anterior borders of eyes silvery white. Antennae uniformly black, with a brush of black bristles at the tip. Abdomen and anal tuft deep black, segment 2 above with a thin and shortened golden yellow belt, a broad one on 4. Legs black, only the hind tibia above with a broad orange-yellow median ring, which is narrow beneath, beyond the ring deep velvety black. Spurs very long. Proboscis absent. Breast without lateral coloured spot. Forewing smoky brown, the median spot a little darker and bearing distally a small orange spot; hind margin black; longitudinal and wedge spots entirely covered with yellowish brown scaling; outer vitreous patch consisting of 4 long spots separated by broad brown vein-streaks and extending into the loose brown scaling of the outer border. Marginal line of both wings thin, smoke-brown. Base of hindwing black, the veins with brown scaling, the cross-vein only incrassate in the anterior half. — This strange species is characterised by the deep black body, the two yellow abdominal belts, the broad orange ring of the hind tibia and the peculiar forewing with its long and not sharply defined outer vitreous patch, and stands quite isolated among the other species. One ♀ from Amasia, in my collection. Named after the Hon. N. C. Rothschild, London.

D. senilis *Gr.-Grsh.* Likewise nearest to *megillaeformis* and *ceiformis*. The antennae long, very strong and *senilis.* above quite black, in ♂ with very thick and long teeth; in ♀ thinner and incrassate before the tip. Palpi, head and thorax clothed in ♂ with unusually long hair, which is black on the outside of the palpi, yellow on their inside, and grey on the other parts; ♀ without this long hair, with the head and palpi bright ochreous. Thorax and abdomen blue-black, the latter with 3 bright yellow belts, complete on underside, and narrower and whitish in ♂. Anal brush of ♂ black in the middle, rusty red at the sides, and straw-yellow beneath; the brush of ♀ entirely black. Legs pale yellow with black joints, the hair longer in ♂ than in ♀; in ♀ the legs more ochreous with brown joints. Costal margin and median band of forewing black, the band distally bordered with yellow in ♂ and orange in ♀. Hind margin scaled orange. Distal area orange, in ♂ yellow, the marginal line thin and black. Base of hindwing orange in ♀, black in ♂. — Easily distinguished by the peculiar ♂-antenna, the long grey hair on head and thorax of ♂, the sexually different anal tuft, etc. Transalai, at an altitude of 11500 ft., and Hindukush (Beïk Pass, July 8).

D. auricaudata *spec. nov.* Expanse 20 mm (♂). Still slenderer than *uroceriformis*, with very narrow *auricaudata.* forewing, whose hind margin is pale yellow. Median band black, outwardly yellow; costal and distal borders brown; vitreous patches very large, longitudinal one almost extending to the median band, outer vitreous patch broader than high, consisting of 5 spots (first spot and last one-half the length of the others), with pale yellow scaling distally, the colouring not being sharply bounded. Hindwing with the distal border narrow and dark, the veins yellow at the base, and the cross-vein also yellow and not incrassate. Body black. Antenna entirely black, dentate, with moderately strong ciliation. Palpi yellow, striped with black on outside, first and second segments with shaggy hair. Frons yellow. Anterior borders of eyes and hind edge of head whitish. Patagia with yellow shoulder-spot. Abdomen with slight yellow belts on segments 2, 5 and 6, and with broader ones on 4 and 7, the belts continuous across underside, the belts broadest on segment 4 and rather less complete on 2 and 7. Anal brush golden yellow, above in the centre and beneath at the sides of the central tuft with thin black stripes. Legs black; tibiae and tarsi yellow, ringed with black. Proboscis atrophied. — Easily distinguished from all the allied species by the slender build of the body, the very narrow forewing, with the hind margin light yellow and the large outer vitreous patch almost reaching to the outer margin, the uniformly black antenna and dark thorax, the peculiar anal brush and by the black anterior femur. Ili district, one ♂ in coll. Püngeler.

D. roseiventris *spec. nov.* Expanse 23 mm (♂). Similar to *loewii*, but slenderer, the abdomen longer and *roseiventris.* more pointed, and, moreover, easily recognised by the uniformly reddish yellow ventral surface. Antenna with strong and dense cilia yellow on underside at the base and distally, otherwise black. Palpi yellowish white, first and second segments striped with black on outside. Frons dark, anterior margins of eyes whitish, likewise the hind margin of the head. Thorax black, clothed with yellowish hair; tip of patagia and the rather large shoulder-spot yellow. Abdomen black, with a narrow yellow belt on segment 2 and a broad one on 4, 6 and 7. Anal tuft black, mixed with yellowish, the base laterally striped with yellow, beneath reddish yellow. Legs yellowish, ringed with black; the black femora of mid and hind legs beneath (outwards) margined with red. Forewing black, dusted with yellow, outer area with whitish spots. Median band dark, not bounded with yellow. Longitudinal patch well-developed, wedge-spot short as in ♂ of *loewii*, but whitish, as is also the outer vitreous patch, which consists of 3 spots, and bears in front and behind the vestige of an additional spot. Base of hindwing black, the black outer border extending to the base; fringes of hind margin reddish white; cross-vein as in *loewii* incrassate anteriorly. — Ili district, 1 ♂. Similar to *pudorina Stgr.*, but considerably less red, with atrophied proboscis, prominent white shoulder-spots, and distinctly dark-ringed hind tibia.

ceiformis. **D. ceiformis** *Stgr.* As in *megillaeformis* the upperside of the antennae entirely black and the abdomen bearing yellow dorsal belts on segment 2, 4, 6 and in ♂ also 7. But the anal brush is entirely black above in ♂, and yellow in the centre on underside; in ♀ above and beneath golden yellow in the centre and black at the sides; on underside segments 4 is in ♂ almost entirely yellow, 7 for the greater part, and 6 bears traces of yellow; in ♀ segment 4 almost entirely yellow and 6 has traces of yellow. Distal border of forewing broader pale yellow outwardly; hind margin of forewing entirely scaled with yellowish red in ♀, yellow in ♂. Palpi of ♂ black, the second segment long-hairy and end-segment yellow; in ♀ yellow, only black at the base. Head black in ♂, with long whitish hair on vertex; entirely yellow in ♀, mixed with some black hairs at the hind margin. Thorax without yellow margins to the patagia, in ♂ strongly mixed with whitish hair, in ♀ with slight white shoulder-spot near the base of the costal margin of forewing. — Central Asia (Osh, end of August; Lepsa, middle of June; Saissan in the Tarbagatai, July).

lasicera. **D. lasicera** *Hamps.* Proboscis absent; palpi with the 2nd joint fringed with very long hair in front and reaching above vertex of head, the 3rd joint long; antennae of male with fascicles of very long hair. Head and thorax black, with some white hair; palpi ochreous, with some black hair and scales, white behind; frons white; legs mostly white, with some ochreous hair and black scales; abdomen black, with ochreous and white segmental bands except on 1st segment, the band on 3rd segment slight, the ventral surface with the bands broad, the anal tuft ochreous with subdorsal black streaks. Forewing with the costal area black-brown, with ochreous streak on costa to beyond middle and slight streaks in the interspaces; the median nervure and veins 4, 5 black-brown; the inner area ochreous white; the cell and a slight streak below it before middle and streaks beyond it above veins 3 to 6 hyaline; discoidal spot black-brown with ochreous outer edge; a terminal black-brown line with ochreous suffusion on its inner side, cilia pale brown. Hindwing hyaline with some black at base, the veins and margins black; cilia pale brown, yellowish white towards tornus. (Copied from Hampson). — From Tibet (Gyantze).

tancrei. **D. tancrei** *Püng.* (52 b). A peculiar species which can hardly be compared with any of the others. Expanse 25 mm (♀). Both wings opaque, being entirely covered with orange-yellow scales, only the narrow distal border being smoky brown and the fringes smoke-grey. The base of both wings, and the costal margin and median band of the forewing are black, the median band being bordered with orange-yellow on outside. The most distal portion of the wedge-shaped area and the whole outer vitreous patch covered by slightly pale scaling. Frons and palpi orange-yellow; the latter with long brown hair on segments 1 and 2, the basal segment with some dark hairs. Body and antennae blue-black, the latter beneath with the basal segment yellow. Patagia with thin brownish inner edge and without pale shoulder-spot. On each side of metathorax a brown tuft of hair. Abdominal segments 2, 4 and 6 bearing a narrow belt each, the two posterior belts being continuous beneath. Anal tuft entirely black or with a thin orange median stripe above. Breast without coloured spot near bases of wings. Legs black; tibiae orange, tarsi yellow, the tibiae with brown base. — Central Asia (Altyn-Tag). In aberrant ♀♀ the yellow scaling is less dense and more brownish, and the veins are blackish, contrasting with the ground. In the ♂ the golden yellow scaling is absent according to Püngeler, the forewing only being yellowish at the hind margin and at the outer side of the black median spot. Palpi dark, only the middle segment yellowish above. Antenna distinctly ciliate, long; vertex, thorax and abdomen clothed with long grey hair; the abdomen with yellowish white belts on segments 4, 6 and 7. Anal tuft dark, beneath extended yellowish white in the centre. Legs yellowish, with dark spots.

polyzona. **D. polyzona** *Püng.* (50 h). We figure here a new species of which Herr R. Püngeler has been so kind as to send me the following diagnosis: "Expanse 25 mm. Similar to *viguraea Püng.*, larger, more elongate, wedge-patch without dark streak, longitudinal patch only scaled in the outer portion, outer patch 5-partite, patagia yellow, abdomen with 6 yellow belts in ♂ and 5 in ♀, the middle one covering the whole segment, proboscis atrophied. Antenna of ♂ densely and strongly ciliate, middle segment of palpi dark with the hair much stronger than in the ♀, the sexes otherwise differing but little. — Transcaspia, Merv, 1 ♀, Central Asia, Ilidistrict, 2 ♂♂, 1 ♀". Type in coll. Püngeler.

viguraea. **D. viguraea** *Püng.* (50 h). Like the preceding lent to us for publication by Herr R. Püngeler, who sent the following diagnosis: "Expanse 21 mm. ♀: outline and structure of the body as in the ♀ of *ichneumoni-*

formis F., forewing golden yellow instead of red, wedge-spot divided by a dark vein, longitudinal area entirely filled up with yellow, outer patch smaller, hindwing with the basal area and hind margin dusted with golden yellow. Body greenish black, antenna dark, frons whitish yellow, palpi, vertex and hind tibia golden yellow, abdomen with paler yellow belts on segments 2, 4 and 6, on underside with the hind edges of segments 4—6 yellow, anal brush dark, beneath golden yellow at the sides. Proboscis atrophied. The ♂ which doubtless belongs here has the forewing much less yellow, with the longitudinal patch only partly scaled, the frons whitish, the head otherwise black, palpi very strongly hairy, antenna distinctly notched and ciliate, abdomen with almost white median belt, there being also traces of the other two belts in one of the ♂♂. Anal brush laterally orange. — East Turkestan, Aksu (capital of the ancient empire of the Uigures), 2 ♀♀, 2 ♂♂ (Rückbeil)". Type in coll. Püngeler.

sareptana.

D. sareptana *spec. nov.* (50 i). Expanse 27.5 mm (1 ♀). Related to *wagneri*, but the margins and base of the forewing greenish black, the hind margin and distal area orange, the median spot black with broad orange outer border. The longitudinal patch shorter, the outer vitreous patch 5-partite, the first spot being very short. Base of hindwing orange, likewise the veins in the proximal area; cross-vein less incrassate anteriorly and orange posteriorly. Head and thorax greenish black. Palpi orange, black on outside, antenna entirely black. Abdomen black, with a brown tone; on segments 2, 4 and 6 yellow belts, of which the middle one is the broadest and ventrally continuous. Anal brush dark. Legs black-blue, the hind tibia entirely orange, the fore and mid tibiae orange with black basal and apical rings. Proboscis atrophied. — From Sarepta (July). Type in coll. Püngeler.

wagneri.

D. wagneri *Püng.* (50 h, i). Also in this case Herr R. Püngeler kindly lent the type and provided us with the following diagnosis: "Expanse 26 mm. ♀: Forewing with 3 well-developed vitreous patches, blackish, the median spot with a very thin golden red outer border, longitudinal patch partly scaled golden red, outer patch 5-partite, golden red distally, bases of both wings golden red. Body stout, greenish black, without markings, abdomen above brownish, without belts, antenna brownish in the lower portion, hind tibia golden red, proboscis atrophied. Central Asia, Ili district, 2 ♀♀ (Rückbeil); a third has black hind tibia and the red at the bases of the wings vestigial. A ♂ caught at the same time probably belongs here; it has the bases of the wings not red, the longitudinal patch golden red, the outer patch 3-partite, broadly bordered with golden yellow, the abdomen with a sharply marked continuous yellowish white belt on segment 4 and a slight, open, whitish belt on segments 2 and 6, hind tibia and the tarsi red, palpi reddish, with black hair, antenna distinctly ciliate". Type in coll. Püngeler.

alaica.

D. alaica *Püng.* (50 h). Like the preceding sent by Herr Püngeler with the following description: "Expanse 24 mm. ♀: Forewing completely scaled, red-lead colour, distal and costal margins and a long triangle contiguous with the median spot black. Hindwing with the basal area strongly dusted with red and the median spot covered with red scaling. Body not so stout as in *wagneri* and *bohatschi*, colouring as in the latter, abdomen on segment 2 with a weak belt open beneath and on 4 a sharply marked closed belt, anal brush red on the sides, mid and hind tibiae red, proboscis atrophied. ♂: very similar to *bohatschi*-♂, wedge-spot longer, divided by a black vein, outer patch 3-partite, abdomen as in ♀ with 2 whitish belts, differs from *wagneri*-♂ on the narrower distal marginal border, the absence of a terminal belt, the belt of segment 4 not being continuous beneath, and in the tarsi and palpi black. — Central Asia, Alai Mts., 2 ♂♀, 1905 (M. Korb)". Type in coll. Püngeler.

bohatschi.

D. bohatschi *Püng.* (50 i). Slenderer and more elongate than *chrysidiformis*, with similar, anteriorly somewhat incrassate antennae, the palpi black, with the end-segment considerably longer and the hair rougher and longer, the frons only in ♀ slightly pale between the antennae, and the thorax uniformly black-blue. Proboscis atrophied. Abdomen blue-black, in ♂ slenderer and longer than in *chrysidiformis*, on segment 4 with a sharply marked yellowish white belt which is very narrow beneath in ♂; in ♀ the belt not continuous beneath. Anal tuft black, red-yellow at the sides, in ♂ also red-yellow beneath in the centre. Legs not so strongly hairy as in *chrysidiformis*, entirely black in ♀, only bearing indistinct red belts on the hind tibia, in ♂ mid and hind tibiae extended yellowish red; base and costal margin of forewing blue-black, the costal border broader than in *chrysidiformis*, likewise the median band, which bears a small red-yellow spot on outside. Hind margin red-yellow, longitudinal patch absent, wedge-spot very short, almost absent in ♀. Outer vitreous patch higher than broad, 4-partite in ♂, 3-partite in ♀, distally merging into the yellow-red colouring of the outer area, upon which follows a brown-black outer band. Veins of hindwing with reddish scaling at the base, median area dark, slightly pointed posteriorly. Marginal band brown-black, sharply defined. Fringes smoky brown. The ♀ is clumsier, with the red colouring more reduced, a broad black hindmarginal area and entirely black veins on the hindwing, the palpi less hairy and the abdomen stouter. Differs from *wagneri*-♀ in the darker forewing, the almost obsolete vitreous spots, the black basi-abdominal margin of the hindwing, etc. The ♂ is distinguished from *wagneri*-♂, which is smaller, by the longer and thicker antenna, very short wedge-spot on the forewing, narrower belt on segment 4, absence of light belts on segments 2 and 6, and by the entirely black palpi and tarsi. — Sarafshan district (Sary-ob, July 6).

vidua.

D. vidua *Stgr.* Related to *azonos Led.* and like this entirely black. The outer vitreous patch of the forewing only indicated by the black scaling being thinner. Hindwing with the black outer border unusually broad. Body entirely black, only the apical portion of the inside of the fore tibia yellowish. — Samarkand.

tristis. **D. tristis** *Stgr.* Differs from *azonos Led.* (52 d) in that the outer vitreous patch of the forewing is almost square; it is transsected by 3 black veins as in *azonos.* The sealed parts of the forewing irrorated with small yellowish scales. Middle segment of palpi with rather long hair and above with a yellowish stripe. Body likewise entirely black. Cross-vein of hindwing not sealed posteriorly and much less incrassate anteriorly than in *anthraciformis* and *vidua.* — North-Western Chinese Mongolia (Uljassutai).

jakuta. **D. jakuta** *Herz.* Glossy blue-black with a feebly yellowish sheen on the last abdominal segment; anal tuft yellow beneath. Palpi yellow, with long black hair on the middle segment. On the black forewing hind margin and cellule 1a sealed red-yellow; the wedge-spot short, outer vitreous patch 4-partite, median spot outwardly with orange spot, a band before the outer margin likewise orange, beneath with a more golden sheen. Hindwing with narrow black distal border, very thin orange-yellow scaled cross-vein, and vein 1 b suffused with a brownish tint. On underside the costal and hind margins of the forewing dusted with glossy golden scaling, as are also the hind margin and veins of the hindwing. Antenna slightly dentate and strongly ciliate. Femora blue-black, the lower half of the tibiae orange-yellow, with yellowish spurs; tarsi yellow. Thorax and breast black. Easily distinguished from the antirely black species by the distally orange-bordered median spot of the forewing, the yellow palpi, and the red-yellow hind and distal borders of the forewing. — Lena district (Ytak-haja, July, 1 ♂).

xanthosticta. **D. xanthosticta** *Hamps.* Expanse 18 mm (♂). Forewing black, with a hyaline wedge-patch in the cell edged with yellow, and a yellow patch beyond the cell, the veins crossing it black. Hindwing hyaline, the base and costa slightly yellow; the veins, outer margins and fringes black. Palpi dark above, yellow below; frons black and surrounded by yellow. Antenna, head, thorax and abdomen black, the abdomen with a yellow dorsal patch on first segment and a yellow sublateral line. Legs black, with some yellow on femora and tibiae. — The species is unknown to me and cannot be placed with certainty from the original description; it agrees perhaps best with the entirely black species, such as *vidua, tristis,* etc. Kashmir.

gruneri. **D. gruneri** *Stgr.* (52 a). Forewing black, with a small red dot beyond the cross-vein, but without red spot at the base and without red hindmarginal streak. Abdomen blue-black, with a short yellow dorsal belt on posterior portion of segment 2; segment 4 above entirely yellow with the exception of a narrow anterior margin. Anal tuft laterally mixed with yellow. The legs bear a brush of bristly hair at the apices of the tibiae. — Amasia and Northern Persia.

turcmena. **D. turcmena** *spec. nov.* (50 i). Expanse 30 mm (♀). Forewing very long as compared with the body, the colour of red lead, with black base, narrow black costal border (slightly widened in centre) and broad brown outer area. Median spot broad, black, densely covered with red scales, longitudinal patch absent, wedge-spot large, outer vitreous patch slightly indicated by the scaling being thinner, the median band therefore joining the outer area. Hindwing with the border dark brown and anteriorly somewhat broadened, black base, and strongly incrassate, posteriorly pointed, dark cross-vein. Underside of wings darker, the orange colouring duller. Head covered with ochreous hair; the frons dark, and the palpus ochreous with black base. Hind edge of head ochreous; antenna red-yellow, above black before the tip. Collar black-blue. Mesothorax worn, the patagia apparently entirely red-lead-colour with yellow shoulder-spot. Metathorax and the stout abdomen black-blue, glossy aenescent green; anal segment above golden yellow. Fore coxa orange, femora blue-black, tibiae red-yellow with blue-black rings at base and apex, tarsi dull yellow, the hind tarsi lighter yellow. Proboscis aborted. — Easily distinguished from all the allied species by the light antenna, ochreous palpi, ochreous hair of the head, blue-black abdomen with yellow dorsum of last segment, red-dusted black median spot of the forewing, and the only slightly indicated outer vitreous patch. Transcaspia (Aschabad), 1 ♀. Type in coll. Püngeler.

Now follows a second group of species which have the abortion of the proboscis in common with the *Dipsosphecia,* but differ essentially from that genus in both sexes having completely sealed forewing.

tengyraeformis. **D. tengyraeformis** *H.-Schäff.* (51 c). Forewing vermilion (duller red in ♂), with the base and a small spot at the apex of cell black, the colouring beyond this spot gradually shading into black, so that the distal marginal area is extended black, only being dusted with a few red scales. Hindwing vitreous, with the outer border narrow, black, only being somewhat broader at the apex, the veins dark, the spot on the cross-vein black. Underside of wings dark, only slightly suffused with a reddish tone at the base of the forering. Body entirely blue-black. Antennae brownish excepting the black apex; above black, in the ♀ with a reddish suffusion. Palpi with long and erect hair, either entirely black (in Mesopotamian specimens) or mixed with yellow hair. Anal tuft above yellow in the centre, in ♀ uniformly black. Legs likewise deep black, only the fore tibia with small yellow tufts of hair on inside at the apex. — Only known from North-Eastern and Central Asia Minor, Taurus Mts. and Mesopotamia; end of June.

fervida. **D. fervida** *Led.* (51 c). Forewing predominantly vermilion, more yellow-red in the outer area; base black. Hindwing with the base, borders and veins red. Fringes of both wings smoke-grey. Antenna longer and thinner (♀) than in *tabaniformis*, yellow-red, with black scaling before the apex. Head and vertex ochreous, collar, patagia and mesothorax orange, but the tip of the patagia and the metathorax blue-black. Segments 4, 5 and 6 of the blue-black abdomen entirely yellow on upperside, beneath only the hind margins yellow. Anal tuft black, yellow above in the centre and at the sides. Legs black, with broad yellow rings, fore coxa ochreous. Cyprus and Amasia, probably widely distributed in Asia Minor, but rare. Varies very much in the extent of the vermilion colour on the wings and body. The following forms have received names: In v. **subfervida** *Stgr.* *subfervida.* the abdomen is entirely black beneath, but bears above 4—6 yellow belts as in the name-typical form. From the Eastern Taurus and Mesopotamia. — **transcaucasica** *Stgr.* *transcaucasica.* has the abdominal segment 2 only yellow above in the posterior half, while segment 4 is entirely yellow on both sides. Moreover, the costal margin of the forewing and the distal margins of both wings black, this colour altogether more extended at the veins and on the patagia. From Southern Transcaucasia (Kasikoparan). — In the form **pontica** *Stgr.*, *pontica.* from Amasia, the fourth abdominal segment is almost entirely yellow above and bears only a yellow hind margin beneath, the rest of the abdomen being black. Anal brush extended yellow in the centre. — Only ♀♀ have hitherto been found of all these forms. Time of appearance: end of May — middle of July.

D. splendida *Stgr.* *splendida.* Forewing deep red, with the narrow outer margin and distal portion of costal margin black; veins suffused with black distally. Hindwing with red veins, and red spot on the cross-vein. Antenna of ♂ slightly serrate, glossy blue-black like the rest of the ♂-body. In the ♀ the head, thorax and antenna more or less suffused with red, the antenna rarely almost entirely black in the ♀. Palpi black in the ♀, often mixed with yellow. Abdomen glossy black-blue as in ♂, likewise the legs. Tarsi now and again with yellowish rings. — Eastern Taurus (Hadjin).

D. stiziformis *H.-Schäff.* *stiziformis.* (52 a). Forewing blue-black, with a small red spot near the base on the patagia; the inner portion of the hind margin and a rather large spot beyond the centre on the cross-vein red. Hindwing hyaline, with narrow black margin. Body blue-black; anal tuft only yellow in ♀ at the tip on the sides. The abdominal segments 4, 5, 6 and in ♂ also 7 yellow above. Legs black. Only from Amasia (middle of June), the Taurus Mts., Mesopotamia and Northern Persia, very rare. — **melasoma** *Stgr.* *melasoma.* is a form with the hindwing almost entirely darkened with black atoms, and the abdomen uniformly black. Transcaucasia and Northern Persia. — The ♂ of the first-described form most probably has the hindwing always darkened, in which case the only distinction of *melasoma* would be the uniformly black abdomen; but perhaps the difference between *melasoma* and *stiziformis* is only sexual.

8. Genus: **Chamaesphecia** *Spul. (1910).*

Differs from *Synanthedon* according to Spuler in that the veins 10 and 11 of the forewing converge towards the margin, usually being conincident in the last third; vein 1 is a chitinous vein in the basal area and for the rest a mere fold in the wing-membrane. On the hyaline hindwing the inner branch of the submedian vanishes suddenly a short distance from its origin; veins 3 and 4 on a short stalk. The proboscis strongly developed in the species examined. The vitreous patches are only absent in exceptional instances, the longitudinal patch never reaches quite to the discal spot and is sometimes completely obsolete, especially in the ♀♀, in which also the wedge-spot is sometimes very short. — The larvae live in the roots (more rarely the stalks) of herbage, particularly Euphorbiaceae and Rumex. Unfortunately the life-history of many species is still entirely unknown, and it is therefore not yet possible to arrange the heterogeneous contents of the genus in natural groups and subgroups. — Type: *empiformis Esp.*

Ch. doryliformis *O.* *doryliformis.* (51 k, l). The hind margin of the head, inner edges of the patagia, and the mid and hind tibiae and tarsi yellow in ♂, red in ♀. Anal tuft of ♀ predominantly red, that of ♂ yellow in the centre and at the sides. Antennae only more or less extended black at the base and before the apex, otherwise brownish in ♀, with white spot in centre in ♂. Patagia with white shoulder-spot near the base of the forewing. This wing with the hind margin and transverse band black-brown; the latter dusted with red scales. In ♀ the forewing more rounded, the outer vitreous patch somewhat narrower, and composed of 5 spots as in ♂. Median spot of forewing beneath orange distally, red in ♀. Underside of abdomen dusted with yellow in ♂, with red in ♀. Breast with a light lateral spot near the wing-bases. In Andalusia, Granada, Portugal, Algeria and Morocco. — The smaller form **teriolensis** *Stgr.*, *teriolensis.* of which a single ♂ has been found at Bozen the end of June, has the hind margin of the forewing brownish and the black median band provided on the outer side with a small orange spot, which is smaller than and not so bright red as in *euglossaeformis*. Veins yellow in the brown outer area. Antenna black, slightly suffused with yellow outwardly. Otherwise similar to *euglossaeformis*, only the hind tibia not so densely hairy. — The larva lives in the roots of Sorrel (Rumex). Moths from May to July, locally common; they fly frequently about the foot-plant, at whose seeds rest the much rarer ♀♀, but they also fly about the flowers of thistles.

icteropus. **Ch. icteropus** *Zell.* (50 i). ♂ considerably slenderer than in *doryliformis*, on the forewing with black median spot which does not bear a small red spot distally or is at most dusted with some ochreous scales. Hind margin orange-yellow, outer area reddish brown; the longitudinal patch and the outer vitreous patch narrower. Antenna uniformly blue-black above, whitish outwardly. Palpi yellow, the two first segments bearing black hair on the outer side. Shoulder-spot of the patagia very small. Abdomen deep black, with the hind margins of segments 2, 4 and 7 whitish, and transverse belts on these segments as well as on 5 yellow, the belt of 4 being the broadest. Anal tuft similar to that of *doryliformis*. Anterior coxa black, margined with yellow on the outer side; tibiae and tarsi yellow, those of the mid and hind legs with an obsolescent blackish ring at the base and apex. Breast with a small yellow side-spot beneath the wing-bases. The ♀ is very different, as is the case in *euglossaeformis*; it is darker brown than the latter and also differs in the base and costal margin of the forewing being bright vermilion, the antenna entirely dark, the vertex ochreous, the brown and narrower belts of the black-blue abdomen, the anal tuft beneath entirely dark, the femora black-blue, the tibiae bright orange-yellow and at the apex spotted with black, tarsi dark, underside of abdomen black-blue. Only from Sicily in June. *unicolor.* The ♀-ab. **unicolor** *Ragusa* has a dark abdomen without light-coloured belts, but, as Zeller has already mentioned, 2 or even 3 abdominal belts may be present. — The larva lives in the roots of Rumex, particularly in R. lunaria.

euglossaeformis. **Ch. euglossaeformis** *Luc.* (51 l). Mostly smaller, and the ♂ slenderer, than in *doryliformis*, the ♀ darker. Median band of the forewing with a vermilion spot on outside, its proximal edge also vermillion; the costal margin black-brown. Longitudinal patch of ♀ just vestigial, wedge-spot shorter; outer vitreous patch narrower than in *doryliformis*, especially much narrowed in the ♀, the first spot as well as the last one sometimes absent. Base of hindwing yellow in ♂, red in ♀, the fringes of the abdominal margin of the hindwing likewise yellow in ♂ and reddish in ♀. In the ♀ the palpi and the inner margins of the patagia orange; shoulder-spot of the patagia absent in ♀, distinct in ♂, yellow. Antenna of ♂ blue-black, outwardly yellowish, with a yellowish spot above before the tip. Palpi yellow, first and second segment with black hair on outside. Vertex and frons mixed with yellow hair; hind edge of head and the broad inner margins of patagia also yellow. Abdomen blue-black, with a more or less distinct row of golden yellow dorsal spots, ♂ with the hind edges of segments 2, 4 and 7 above yellow and further down white; on the sides of the last 4 segments small yellowish spots which extend somewhat on to the underside. Anal brush similar to that of *doryliformis*, a thin median mark in the centre on upper side reddish yellow. In the ♀ the abdomen blue-black, with yellowish and whitish belts on segments 2, 4 and 6, and yellow spot on the side of 5, similarly as in ♂, the anal tuft vermilion above, and sometimes may laterally striped with red on the underside. Legs in ♂ almost entirely yellow; the mid and hind tibiae with bushy hair and at the base a blackish ring. In the ♀ the legs black-blue, the anterior coxa margined with orange on the outer side, the fore femur yellow inside, and the mid and hind tibiae with conspicuous vermilion hair; tarsi blackish. — Algeria, in May and June; in Oran already the end of March.

ceriaeformis. **Ch. ceriaeformis** *Luc.* (50 k). Only the ♀ is before me; it differs from *euglossaeformis* in that the body and all the appendages are uniformly black blue, only a few hairs at the tip of the patagia, the centre of the anal tuft above, and the mid and hind tibiae, with the exception of a basal and apical ring, vermilion; no coloured spot on breast. The base of the forewing, its hind margin as far as the median band and a spot in the outer part of this band vermilion. Discocellular spot and base of the hindwing black, likewise the fringes of the hind margin. Underside of wings nearly as in *euglossaeformis Luc.* — A ♂ which may belong here is similar to *euglossaeformis Luc.*, but like the ♀ has no yellow lateral spot on the breast, and the vertex and hind margin of the head are slightly yellowish. The yellow colouring at the inner margins of the patagia, in the anal brush (in the centre, at the sides, beneath prodominant) and at the inside of the mid and hind tibiae is light yellow. The femora dark, the tibiae with blackish basal spot, the mid tibia also bearing a distinct apical spot. The tarsi blackish. Antenna of ♂ with a white spot before the apex, outwardly dirty white. — Algeria (Alger, Lambessa, Biskra), May-June.

minianiformis. **Ch. minianiformis** *Frr.* (recte miniacea) (51 l). Most easily distinguished from *chrysidiformis* by the median spot of the forewing being narrowly edged with vermilion proximally and distally. The brown-black colouring of the outer area of the forewing proximally shading into vermilion. Base of hindwing not black, but yellow in ♂ and orange in ♀. Palpi yellow in ♂, with black hair on outside, in ♀ entirely orange. Patagia with pale inner border and yellow shoulder-spot. Abdominal segments 2, 4, 6 and in ♂ also 7 with whitish or yellowish posterior edges. Anal tuft of ♂ above entirely black or with a thin red median streak, not red at the sides; in ♀ above in the centre with 2 narrower red stripes. Tibiae vermilion, the mid and hind tibiae distally spotted or striped with black-blue, the tarsi of the ♀ with dark scaling. The outer vitreous patch is sometimes entirely absent, being filled up by red scaling. Balkan Peninsula, Southern Dalmatia, Asia Minor, Taurus, Cyprus, Transcaucasia, and Northern Persia (Astrabad), May to July; at Smyrna already observed the middle of April. — *pepsiformis.* The smaller ab. **pepsiformis** *Led.* is paler, the red colouring pale, yellowish, reduced. From East Rumelia, Turkey and Bithynia. *destituta.* The ab. **destituta** *Stgr.* (50 i), from the Taurus, has hardly any vermilion scaling on the forewing, the distal marginal area being entirely dark and the middle of the anal brush yellowish; the yellow colouring however reduced. Only 2 ♂♂.

chrysidiformis. *gallica.* *chalcocnemis.* *nigripes.* *obturata.* *joannisi.* *chalcocnemis-infusca.*

Ch. chrysidiformis *Esp.* (52 d). Forewing vermilion, the costal margin and the distal marginal line black; median spot black, with rather broad vermilion outer border. Antenna above black-blue; palpi black-blue with the end-segment yellowish. Frons mixed with yellow. Thorax black-blue, only with a yellowish shoulder-spot and slight yellowish or reddish hair on the metathorax. Abdomen blue-black, segments 4, 6 and in ♂ also 7 with whitish or yellowish posterior margins. Anal tuft of ♂ red in the centre and striped with red at the sides; in ♀ above red, black at the sides and beneath. Anterior coxa black, yellowish and whitish on outside. Tibiae and tarsi predominantly vermilion. — A ♀ in coll. RAGUSA, Palermo, has hardly a trace of the vitreous patches, the forewing therefore are scaled red above and beneath with the exception of the margins; the median spot is black above and entirely red beneath. — The following aberrations have received names: ab. **gallica** *Bartel* has the antennae above pale yellow or whitish, only the apex being black. ab. **chalcocnemis** *Stgr.*, from Southern France, Albarracin, Southern Andalusia and Portugal, occurs in both sexes, and has the forewing predominantly dark, the antennae black, the legs aenescent, and the abdomen either with a white hind margin to segment 4 or uniformly black-blue. ab.-♀ **nigripes** le *Cerf* has the tarsi of all the legs black-blue, otherwise like the type-form. In ab. **obturata** *le Cerf* the outer vitreous patch of the forewing is entirely absent, the whole area between the dark outer border and the black median spot occupied by vermilion scaling, below by orange scaling; more common among the ♂♂ than ♀♀. In ab. **joannisi** *le Cerf* the abdomen bears only a white belt on segment 4; everywhere among the type-form. ab. **chalcocnemis-infusca** *le Cerf*, from Corsica, is like ab. *chalcocnemis*, but differs in the outer vitreous patch being absent and replaced by scaling dusted with red. — In Central and South-Western Germany, Southern England, Belgium, France, Lower Austria, Southern Hungary, Istria, Dalmatia, Italy, Portugal, Spain; the ab. *chalcocnemis* only in Southern France and Iberia. The larva is yellowish white, with the dorsal vessel shining through, the head and pronotal plate brown; lines in the stalks and rhizomes of Sorrel (Rumex acetosa and crispus), Artemisia campestris and Helychrysum, causing the plants affected to wither and preventing them from flowering. Moth from May to July, rests drowsily on flowers of Composites, Calendula and Rubus, and only swarms about the flowers in bright sunshine; emerges at the lowest portion of the stem.

lecerfi.

Ch. lecerfi *Oberth.* According to OBERTHÜR similar in facies to large specimens of *chrysidiformis*, of slender shape, with the head, thorax, abdomen and legs entirely black. Forewing with the costal margin and outer border black, the latter being tinged with red at the 4-partite vitreous patch. Median spot black, edged with red on outside. The submedian space and the hind margin have a red tone. Fringes of both wings black. Very characteristic is the very slender abdomen. — Vernet-les-Bains (East Pyrenees), in the spring, 1 ♂.

turanica.

Ch. turanica *Ersch.* has the costal and distal borders of the forewing and the median spot black, the spot not being edged with red. Hind margin and proximal portion of the distal area vermilion. Base of hindwing vermilion. Palpi black. Hind margin of head whitish. Abdomen blue-black, with yellow dorsal belt on segment 4. Anal brush whitish yellow in the centre. Hind tibia orange. — Turkestan, May, and Pamir, second half of July, 9000 ft. Not known to me in nature.

zimmermanni.

Ch. zimmermanni *Led.* (52 d). Forewing red-yellow, the costal margin and median band aenescent green, the latter indistinctly bordered with red-yellow. Outer vitreous patch consisting of 3 long spots; marginal line thin and brown. Patagia with a yellowish shoulder-spot. Palpi, vertex, inner margins of the patagia and a thin median line on the thorax reddish yellow, partly golden yellow. Proboscis feebly developed. Abdomen aeneous green, with yellowish dorsal belts on segments 2, 4, 6 and in ♂ also 7; on underside uniformly yellow in ♂, with yellowish belts on segments 4 and 6 in ♀. Anal tuft above red-yellow in centre and black at the sides mixed with yellow hairs; beneath predominantly red-yellow in ♂, almost completely black in ♀. Breast with large yellow lateral spot near the wing-bases. Anterior coxa aeneous, yellow on outside; fore tibia yellow, the other tibiae red-yellow; tarsi yellow, in ♀ blackish brown. Antennae black-blue, yellow outwardly. — Specimens from the Achal-Tekke district (Nuchur) have the red on the forewing paler and the longitudinal stripe of the thorax purer white. — Widely distributed in Northern Persia, in June.

chrysoneura.

Ch. chrysoneura *Püng.* (50 i). "Expanse 16 mm. Near *zimmermanni*, much smaller. Forewing golden yellow, distal border, costal margin and median spot black, longitudinal patch entirely covered with golden yellow scaling, wedge-spot short, outer patch tripartite; margin of hindwing narrowly dark, proximally bounded with yellow golden, veins and median spot golden yellow. Body slender, greenish black, palpi yellow with the middle segment short-hairy, hair on vertex and edges of patagia yellow, antennae dark, with rather short cilia in ♂, hind leg yellow golden and black, abdomen in ♂ with 4, in ♀ with 3 whitish, anteriorly yellowish belts, on underside dusted with yellow, anal brush narrow, dark, beneath golden yellow. — Central Asia, Ili district, 1 ♂, 2 ♀♀ (RÜCKBEIL)". The above description was kindly sent me by PÜNGELER.

oryssiformis.

Ch. oryssiformis *H.-Schäff.* (52 d). Forewing vermilion, with the costal and distal margins narrowly black and the median spot broad and black. The wedge-spot in the cell divided by a red vein; the outer vitreous patch traversed by one or two red veins. Hindwing with narrow brown-black margin, the spot of scales on cross-vein black, broad and of even width; veins red. Body black, with a steel-green sheen. Antennae black. Patagia, abdominal segments 4—6 above and beneath and the anal tuft entirely vermilion, segments 4—6 being thinly edged with black above. Anal tuft with a few steel-blue hairs at the sides. Mid and hind tibiae vermilion, the latter black at the base. Sometimes the legs are entirely black, only the tibiae being extended red in the middle. The last three abdominal segments sometimes only with red hind margins variegated with white scales. — Corsica, Sicily, in May.

seitzi. **Ch. seitzi** *Püng.* (= suprema *Oberth.*) (51 l). Related to *oryssiformis H.-Schäff.*, as in the latter the forewing vermilion, with the costal edge narrowly black, often only extending to the centre, and the outer margin broader and deep black, there being no vitreous spots. Median spot black, similar to that of *oryssiformis*. Hindwing with cross-vein similarly incrassate by black scaling, the veins black, sometimes predominantly red, and broader brown-black distal margin which is especially broad at the apex. Fringes darker greyish black. While the underside of the forewing is vermilion in *oryssiformis* like the upperside, it is darkened with smoke-brown in *seitzi*, only rarely being paler than above. Head black, the eyes brown, the antennae short, in ♂ with short cilia, the palpi elongate and black. Thorax and abdomen blue-black, patagia and anal half of the underside of the abdomen entirely red. The abdomen bears usually a red dorsal belt on segment 4, the anal brush being black; or the last 3 (in ♂ 4) segments as well as the anal brush quite red; in the ♀ the abdomen is rarely quite black above with the anal brush red only in the centre. Legs blue-black, the tibiae frequently entirely or partly red. In an aberrant ♂ the red of the forewing above and of the abdomen beneath is strongly darkened. — Algeria (Lambessa, May to early July). Rests on Tithymalus atlanticus, in whose roots presumably the larva lives.

lahayei. **Ch. lahayei** *Oberth.* (51 l). In facies similar to *chrysidiformis*, but most nearly related to *seitzi* and *foeniformis*. The forewing with the costal margin and median spot black and the hind margin and distal area red. The wedge-spot and the outer vitreous patch well developed. Hindwing with rather large black median spot and, like the forewing, with black marginal band and black fringes. On the underside of the forewing the red colouring replaced by brown-red. Body and antennae black. Patagia red, likewise the last 3 abdominal segments, of which each is black anteriorly. Anal brush red, with some black hairs at the sides. On the ventral side the posterior half red. Legs black, the tibiae red in the centre. Algeria (Aïn Sefra, April; Biskra). — Le Cerf gives the following description of the ♂ (Bull. Soc. Ent. Fr. 1911 p. 243): Palpi black like the frons, eyes and thorax; prothorax with a small vermilion spot on each side; patagia with vermilion inner border; the last 4 segments of the abdomen beneath vermilion. Legs as in the ♀ with black tibial spurs. The *oryssiformis*-♂ differs from *lahayei*-♂ as follows: forewing entirely vermilion without vitreous spots, the last 4 abdominal segments red above, the palpi with traces of rusty red, tip of antenna indistinctly white, spurs of tibiae blackish, and lastly the anal brush with small red bristles laterally.

foeniformis. **Ch. foeniformis** *H.-Schäff.* (50 k, 52 e). ♀: Forewing according to Herrich-Schäffer without vitreous spots, red, with broad black costal border which is dilated triangularly posteriorly occupying the entire cell, so that the black median spot is not separated. Distal margin with black border. Hindwing with the veins broadly scaled with black-brown, the median spot broad and black and the distal border rather broad and brown. Forewing beneath black with some small red spots in the distal area; hindwing darker than above. Body black-blue. Head beneath with some red scales. Patagia inwardly with red hair. Abdominal segment 4 posteriorly with a thin red belt, the thin hind edge itself being whitish; segments 4 and 6 margined with red at the sides; on underside the last 3 or 4 segments entirely vermilion. Anal brush red with black sides, or entirely red. Legs black; mid and hind tibiae red on outer side. A ♀ in coll. Philipps (Cologne) (50 k) perhaps belongs here; the vitreous spots of the forewing are vestigial; the wedge-spot is short and divided by a dark line and the outer vitreous patch composed of 3 very narrow spots. Black costal margin of forewing of uniform width, as is also the distinctly prominent median spot. The ♂ (50 k) which presumably also belongs to this species is entirely different; it is before me from coll. Ragusa. The costal margin is broadly black, broader than in *chrysidiformis*; median spot broad, black (without a red border on outside). The wedge-spot well developed and traversed by a red vein; the outer vitreous patch small, divided by 2 red veins. Marginal band of forewing and especially of the hindwing narrower; median spot of the latter thinner. On the underside the outer area of the forewing almost entirely red. Anal tuft black, above and beneath vermilion in the centre. — Sicily (Rucazzo, Pedogni, Monticelli, Noco, Fieuzza), in June.

margiana. **Ch. margiana** *Püng.* (50 k). "Expanse 22 mm. Near *foeniformis H.-Schäff.* Forewing narrow, entirely scaled, golden red, distal margin, costal margin with the exception of the basal third, and the median spot black, hindwing with the median spot dark, broad and of even width, and the veins partly reddish. Body slender, elongate, greenish black, palpi yellowish, hair of the middle segment long but not dense, likewise the cilia of the dark and thin antenna, hind tibia with broad whitish belt, abdomen with 4 whitish belts which are open beneath, anal tuft narrow, dark, beneath yellowish white. — Transcaspia, Merv (Antiochia Margiana of the ancients), 3 ♂♂." Type in coll. Püngeler, who was kind enough to send me the above description.

chalcidiformis. **Ch. chalcidiformis** *Hbn.* (52 e). The smallest of the red-winged species: expanse 15—17 mm. Wings vermilion, with the base black and the narrow costal border green-black. Median spot black, with red border on each side. Wedge-spot vestigial; outer vitreous patch only consisting of 3 small spots. Distal border relatively broader, not deep but brown-black and inwardly not so sharply defined. Cross-vein of hindwing more thinly scaled, posteriorly very fine. Palpi white, in ♀ the end-segment dark, and in ♂ the hair black on the outer surface. Vertex with yellowish hair-crest. Patagia without light shoulder-spot. Thorax and abdomen black, with aeneous green sheen, without pale belts. Anal tuft in ♂ red in centre, in ♀ red above and black beneath. Anterior coxa of ♂ blue-black, of ♀ glossy white; legs black, mid and hind tibiae with extended vermilion hair in the centre; tarsi of ♂ yellowish. The black median band very rarely entirely scaled red; in rare aberrations the red replaced by silvery white. Lower Austria, Hungary, Dalmatia, Piedmont, Sicily, Roumania, Balkan Peninsula, Crete, Southern Russia, Kasan, Volga-Ural district, Transcaucasia, Northern Asia Minor, Syria and Taurus; from May until August. — In ab. **expleta** *Stgr.*, from Crete, Macedonia, Brussa, Angora, Taurus, Mesopotamia and Syria, the outer vitreous patch of the forewing is entirely and densely covered with red scaling, the brown-black distal margin broader, and the vertex without yellowish hair-crest.

expleta.

schmidtiiformis.

Ch. schmidtiiformis *Frr.* (recte schmidtii) (52 e). Always considerably larger than *chalcidiformis*, but with the green-black costal margin much narrower and the distal marginal band brown-black, narrower, and sharply defined on both sides. Cross-vein of hindwing much more broadly scaled black. Vertex with light yellow hair. Abdominal segment 4 above with a narrow white hind margin, which is sometimes absent. Fore coxa entirely white in both sexes; tarsi aeneous. Palpi of ♂ usually more white, black on outside. The outer vitreous patch is frequently covered by dense vermilion scaling; it is very rare in this species that the vermilion colour is replaced by silvery white or pale yellow; there are 2 exceptionally pale yellow ♀♀ in coll. Püngeler received from Konia together with normal ones. Croatia, South Hungary, Dalmatia, Sicily, Bulgaria, East Roumelia, Turkey, Northern and Central Asia Minor, Armenia. — In the paler ab. **albotarsata** *Rebel*, from Sicily, Central Asia Minor (Konia) and Armenia, the dark costal border to the forewing has almost disappeared, and the tarsi of all the legs are whitish yellow. — Rebel believes the food-plant to be Salvia verticillata. Moth in June.

albotarsata.

elampiformis.

Ch. elampiformis *H.-Schäff.* (52 e). An exceedingly slender species, with the body entirely glossy green-black, the costal margin of the forewing of the same colour and somewhat widened in the centre; median band and hind margin of the forewing entirely red. Outer margin brown-grey, proximally red, not sharply defined. Fringes brown-grey. Cross-vein of hindwing not strongly scaled and like the other veins thinly smoke-brown. Palpi and ventral edge of head red; vertex and hind margin of head yellow. Thorax with some red hair posteriorly at the sides. Anal tuft red with black sides. Legs aeneous, tarsi yellowish; hind and mid tibiae extended vermilion in the middle. Wedge-spot of forewing small; outer vitreous patch not very prominent, composed of 3—4 very small spots with whitish scaling. — Brussa, Amasia, Ordubat in Southern Transcaucasia, Shahrud and Astrabad in Northern Persia, and Hadjin in Mesopotamia, in June on Rumex.

masariformis.

Ch. masariformis *O.* (51 g). Median spot of forewing not edged with orange on outside as in *ichneumoniformis* and allies, at most with a very slight yellowish border. Antennae black, finely yellow outwardly before the apex, with very short cilia in ♂. Palpi orange-yellow, on outside (in ♂) and at the apex usually blackish, at the base often whitish. Hind edge of head orange. Patagia with broad orange inner borders, thorax without median stripe, on metathorax two orange tufts of hair; shoulder-spot near base of forewing orange. Segments 2, 4, 6 and in ♂ also 7 of abdomen with broad deep orange belts which occupy almost the entire segments. Segments 3 and 5 above usually with an obsolescent stripe in the centre. On the sides of the segments, with the exception of 1 and 3, there is an orange-yellow stripe. On the underside segment 2 entirely whitish or orange-yellow, while segments 4—6 and in ♂ also 7 have broad orange posterior margins. Anal segment above at the base and in ♀ also beneath always black. Anal tuft of ♀ orange, black at the sides and beneath, being frequently mixed with orange beneath in the centre; in ♂ with 2 narrow orange-yellow lateral tufts separated from one another, slightly mixed with blackish at the apex, beneath whitish in the centre. Fore coxa of ♀ orange-yellow, of ♂ white or yellow with dark edge on inside. Tibiae and tarsi orange; the former with very thick scaling, more or less black at the base, and with a sharply defined broad black-blue subapical ring; tarsi with dark dusting on upperside. The vitreous spots of the forewing are more or less dusted with yellow, especially in the ♀; longitudinal patch of ♂ distinctly reaching beyond middle, in ♀ vestigial; outer hyaline patch broader in ♂ than in ♀, composed of 3—5 spots, of which the first and last are usually filled in with orange. The distal area, which varies much in extent, bears more or less distinct orange-yellow streaks. Marginal band of hindwing narrow, brown; cross-vein pointed posteriorly, rather strongly scaled anteriorly. This pointed discocellular bar distinguishes the species easily from *annellata* and its forms, in which the scaled discocellular bar of the hindwing is of even width; moreover, in *annellata* the streaks in the outer area of the forewing are never so distinct and bright, the colouring of the belts and tibiae is never deep orange, and the antenna of the ♂ is much more strongly notched and ciliated; thorax of *annellata* with median stripe, and the yellow belts on abdominal segments 2, 4 and 6 much narrower. — The form **odyneriformis** *H.-Schäff.*, from Greece and Crete, differs in the more yellow colouring, the hyaline spots of the forewing being dusted with yellow, the fringes distally edged with yellow, and the abdomen bearing on segment 5 a broad additional yellow belt. — *Ch. masariformis* is distributed from South-Eastern Germany, Switzerland, the Tyrol, Moravia, Lower Austria to Hungary, Dalmatia, Central and Southern Italy, East Roumelia, Turkey, Greece, Southern and Eastern Russia, Asia Minor, ? Syria, Central Asia (Kuldja). The larva lives in the roots of

odyneriformis.

Verbascum, pupation in the ground; emergence from the middle of May to the middle of July.

allantiformis. **Ch. allantiformis** *Ev.* (51 g). Very close to *masariformis* and perhaps only a local form of it. The median band of the forewing essentially narrower, the longitudinal patch longer, particularly in the ♀; the outer hyaline patch moreover larger in both sexes and its first spot and last one not filled in with yellow. Outer marginal area very narrow in ♂, broader in ♀, always with a row of yellow streaks. Palpi white, suffused with yellow on the outside. Veins of the hindwing with yellow scaling. Abdomen with additional yellow belt on segment 3 (a trace of a belt also on 5); on underside segment 2 entirely white, the last 3 (in ♂ 4) segments also white, bearing at most some orange scales posteriorly; segment 3 always with a white spot beneath (in *masariformis* always dark). Anal brush of ♀ not black above at the sides. Tibiae orange, the subapical black ring not so broad as in *masariformis*; fore coxa silvery white, with blackish margin in ♂. — In the steppes of the Volga and Ural districts, the North-Western Caucasus, Transcaucasia, and the neighboring districts of Asia; from the end of May until July, flies frequently about the flowers of Achillea.

loewii. **Ch. loewii** *Zell.* (51 g). Nearest to *masariformis*; the colouring of the light parts never orange, but golden yellow, the antennae yellow on the outside throughout their length, in ♂ serrate, with longer cilia. On the dark brown forewing the longitudinal patch is vestigial in the ♂ and absent in the ♀; outer hyaline patch smaller, composed of 3—5 small spots edged with yellow, as is also the wedge-spot; marginal area very dark, broader in ♀ than in ♂, with small yellow streaks, which are sometimes missing in the ♀; sometimes the outer vitreous patch is almost extended to the outer margin in the ♂. Palpi yellow, whitish at the base, in ♂ the middle segment with black hair on the outside and the end-segment with black tip. Of the yellow belts of the abdomen the one on segment 4 is the broadest; segments 2 and 3 in ♂ and 3 in ♀ have often slight yellow stripes above; segment 2 beneath almost entirely yellow, 4—7 in ♂ with yellow belts (sometimes entirely yellow); in ♀ the last 3 segments with yellow belts beneath, of which the one on segment 4 is the broadest. Anal tuft black in ♀, above in the centre with 2 yellow longitudinal streaks; in ♂ yellow, with 2 broad black lateral tufts. Fore coxa white, mixed with black in ♂. Tibiae yellow, with black subapical ring on the mid and hind tibiae; these rings sometimes almost disappear entirely. Tarsi yellow, dusted with dark scaling. Very small specimens of this species without other distinctions have been separated as ab. **loewii**
minor. **minor** *Stgr.* — From Syria, the Taurus, Asia Minor, and Southern Transcaucasia (Kasikoparan); from May until July.

moreaui. **Ch. moreaui** *le Cerf.* Of the same size as *loewii*, but more robust and the wings more rounded. Head black, frons white anteriorly, vertex with fine whitish bristles. Palpi yellowish white, with a black exterior line. Antennae long, very thin, with very short cilia, black on inside, outwardly whitish at the apex. Thorax black, with a large yellowish white shoulder-spot and on each side a large spot variegated with whitish hair. Patagia and metathorax entirely covered with white-yellow hair. Abdomen black, segment 2 beneath and half of it above pale yellow, segments 3 and 5 with some small pale yellow scales, 4, 6 and 7 above entirely light yellow; on 4 and 7 the yellow colour decreases downwards, but reaches the ventral side. Anal brush very short, composed of 2 central pale yellow tufts and 2 small yellow lateral ones. Coxae and femora bronze-black, margined with pure yellow, the femora black at the base; tibiae yellow, base and a ring black; tarsi pure yellow. Forewing bronze-green, strongly variegated with yellow scales, the 3 hyaline patches well-developed, particularly the outer one, which is composed of 5 spots and extends to the outer margin, the distal border therefore very narrow. Hindwing hyaline, veins and a narrow border coloured as on forewing. Fringes of both wings grey, interrupted with yellowish at the base of the hindwing; on underside small yellowish scales cover the discocellular bar and hind margin. Expanse 23 mm. — Amasia. Differs from *loewii* in the larger size of the vitreous patches, the reduced anal tuft, the thin antennae and the pale tone of the yellow colouring.

pechi. **Ch. pechi** *Stgr.* (51 g). Nearest to *loewii*, distinguished by the longer cilia of the ♂-antenna. The forewing has a rounded outer vitreous patch which consists of 3 spots in ♀ and of 5 in ♂; outer area rather broad, with 4—6 small obsolescent yellowish streaks. Vertex and frons black in ♂ slightly variegated with yellow, yellow in ♀. Palpi also yellow, with black hair on the outside. Antennae suffused with yellow on outside, otherwise black above, in ♂ slightly serrate, with rather long cilia. Abdomen of ♀ with yellow belts above and beneath on segments 2, 4, 5 and 6, the belts broadest on segments 4 and 2, narrowest on 5. In ♂ complete belts usually only on segments 4 and 7, the belts much narrower and more indistinct on the other segments, on underside segments 2 and 4—7 entirely yellow. Anal brush in ♂ centrally yellow, beneath orange, with the sides black; in ♀ black, at most mixed with yellow at the extreme tip. Fore coxa blackish, whitish on outside; tibiae and tarsi yellow, the former with a subapical black ring, tarsi with blackish suffusion. — From Algeria in June (Sebdou, Oran; Lambessa).

proximata. **Ch. proximata** *Stgr.* (52 b). Forewing of ♂ with a very large outer vitreous patch leaving only a very narrow distal border, which is not dusted with yellow; in the ♀ the outer border broad and like the median band without yellowish dusting. On underside the outer border likewise without yellow spots. Antennae almost entirely yellowish brown, only the apex being black; the ♂-antenna somewhat thicker, more serrate and with longer cilia than in *masariformis*. The yellow colouring of all the other parts of the insect pale lemon-yellow, nearly as in *loewii*. Palpi, legs and abdomen nearly as in *loewii* and *masariformis*; the yellow belts on segments 4 and 6 of abdomen broadest, the belt on segment 2 distinct, those on the other segments much *fallax.*

weaker and sometimes almost absent. Easily distinguished from *loewii* by the distal marginal area of the forewing not bearing yellow scaling above and beneath, and the antennae being yellowish brown. Pontus and Taurus, middle of June to middle of July. — The form **fallax** *Stgr.* differs in the terminal area of the forewing being broad and golden yellow traversed by the feebly black veins, the costal and hind margins of the forewing, as well as the veins of the hindwing being suffused with gold yellow. The golden yellow colouring is even stronger on the underside. Antennae entirely brownish yellow (without black apex). The yellow belts of abdominal segments 4 and 6 considerably broader. From Syria (Beyrut), and questionably also from Northern Persia.

doryceraeformis.

Ch. doryceraeformis *Led.* (51 g). Forewing golden yellow at the costal, hind and distal margins, with the exception of the dark median band. Longitudinal patch distinct in ♂, absent in ♀; outer hyaline patch 4-partite, but the first spot usually entirely covered with yellow scales. Marginal line narrow, dark brown. Transverse band of forewing beneath black, its outer half yellow, sometimes the band entirely black. Face whitish, eyes bordered with white. Palpi whitish yellow, the basal segment white. Collar yellow. Antennae blue-black, entirely golden yellow on outside, with short cilia in ♂. Thorax with yellow median stripe and yellow inner edges to the patagia; shoulder-spot distinctly yellow. Abdomen bright golden yellow, with sharply defined black belts which are continuous on underside, and are broader in the ♀. Anal tuft golden yellow, in ♂ the extreme lateral angles mixed with black; in ♀ with deep black lateral stripe. Anterior coxa whitish yellow; femora yellow striped with black; tibiae and tarsi golden yellow, the former with indistinct blackish subapical ring. — North-Eastern Asia Minor, and Mesopotamia, end of June and early July. Distinguished from the allied species by the golden yellow forewing bearing a black median band, the median stripe of the thorax, the golden yellow abdomen with black belts, and the nearly entirely golden yellow anal brush.

regula.

Ch. regula *Stgr.* (52 b). Always much smaller than *doryceraeformis* and not golden yellow on the forewing, but dull brownish yellow. Longitudinal patch of ♂ only vestigial. Median band not deep black, but suffused with brownish yellow. Outer vitreous patch longer than high, consisting of 3 or 4 small spots. Cross-vein of hindwing not so much incrassate as in the previous species, but its scaling rather narrow, nearly as in *empiformis*. Colouring brownish; frons and palpi yellowish white, sometimes almost white, or light brownish yellow. Abdomen uniformly brown-yellow, with obsolescent dark belts, which are not so deep black and sharply defined as in *doryceraeformis*. Venter light brown or brownish yellow, sometimes dirty white-yellow in ♂ (as is sometimes also the case on upperside). Anal tuft laterally with a few blackish hair. Fore coxa brownish white or pale brownish yellow; legs light brownish; tibiae with vestiges of dark rings. — Mesopotamia (Mardin, end of June, early July).

leucoparea.

Ch. leucoparea *Led.* Slender, with narrow wings. Expanse 15—16 mm. Costal margin, transverse band and hind margin of forewing brown, the hind margin dusted with golden yellow, and the median band slightly edged with golden yellow on outside. Distal area gold-colour, brownish towards the margin. The wedge-spot small, the outer hyaline patch rounded, only traversed by 2 brownish veins. The distal border of the hindwing narrow and brown, and the cross-vein anteriorly incrassate. Forewing beneath almost entirely covered with yellow on the scaled portions. Body blue-black; frons, antennae and palpi pale golden yellow, the palpi blackish on outside. Eyes anteriorly bordered with glossy yellowish white. Patagia with pale golden yellow or whitish inner border. On the metathorax at each side a yellowish tuft of hair. Abdominal segments 2, 4, 6 and in ♂ also 7 with golden yellow belts, which are broader beneath and continuous. Anal tuft black in ♀, only edged with yellow at the sides, in ♂ the centre and sides narrowly yellow. Legs golden yellow, with minute black spots. — Allied to *loewii*, but smaller and slenderer, and differing also in the outer area of the forewing being golden, the median band exteriorly edged with yellow, the hind margin yellow, and in the abdominal belts and anal tuft being different. — Northern Persia (Astrabad and Shahrud).

aurifera.

Ch. aurifera *Rom.* The scaled portions of the forewing dusted with golden yellow, the median band deep brown-black, wedge-shaped, margined on outside with yellow or copper-brown or violett. The longitudinal patch absent in both sexes; outer hyaline patch present, but small. Base and veins in the central and distal areas of the hindwing scaled yellow. Head golden yellow. The antennae black, dusted with yellow scales and in ♂ bearing short dark grey cilia; the basal segment very short, incrassate, yellow beneath. Base of palpi light yellow shading into golden yellow, end-segment dirty yellow and middle one densely scaled. Proboscis thin, dark brown. Thorax blue-black; collar, patagia, and a median dorsal stripe yellow. Abdomen golden yellow, the edges of the segments greenish or bluish with a silvery sheen. Anal tuft orange, changing into black at the sides. Venter yellow. Legs glossy pale yellow; the tibiae densely covered with hair-scales. — Easily distinguished from the allied species by the absence of the longitudinal hyaline patch on the forewing, the golden yellow patagia, the broad golden yellow belt on each abdominal segment, the nearly entirely orange anal brush, yellow venter and the uniformly yellow tibiae. — Southern Transcaucasia (Kasikoparan, end of June).

annellata.

Ch. annellata *Zell.* (51 g). Smaller than *masariformis*; expanse 13—20 mm. The colouring not so deep orange-yellow, the cross-vein of the hindwing with its scaling of even width, not tapering posteriorly, the outer border of the forewing without yellow streaks or these not so bright and never orange-yellow, the thorax with a yellow median stripe and on the patagia a pure white shoulder-spot. The antennae bear golden yellow scaling on outside, and are in ♂ much more strongly notched and ciliated. The belts on abdominal segments 2, 4, 6 and in ♂ also 7 not so very broad and not orange-yellow as in *masariformis*, but more whitish yellow. Legs white-yellow, tibiae with a broad subapical black ring. Abdomen usually with the yellowish white belts on segments 3 and 5 weaker. Anal brush mostly black, with two narrow streaks in the centre, beneath yellow in the middle. Very variable in size and colour and in the extent of the light colouring. In Greece *ledereri.* and Asia Minor (and elsewhere as aberration) occurs the from **ledereri** *nom. nov.* (= *ceriaeformis Led.*), which is smaller and darker, and bears a white belt on segments 4 and 6 of the abdomen. On the other hand, ab. *oxybeliformis.* **oxybeliformis** *H.-Schäff.* (51 g), from Hungary, East Roumelia, Morea, Sarepta, Transcaucasia, Amasia and other places, is larger and more yellow, the distal border of the forewing being spotted with yellow and the abdomen banded with yellow above, the belts being distinct beneath on all the segments. — Southern Bavaria, Lower Austria, Carinthia, Galicia, Transsylvania, Hungary, Toscana, Southern France, Roumania, East Roumelia, Turkey, Greece, Southern Russia (Taganrog and Kuban district), Transcaucasia, Bithynia, Pontus and Taurus, middle of May to end of July; the ab. *oxybeliformis* observed in Morea at 2470 ft as late as early September. The larva lives in the roots of Ballota nigra.

pudorina. **Ch. pudorina** *Stgr.* Forewing blackish, suffused with vermilion, with small vermilion spots in the distal area. Palpi and patagia predominantly reddish. Thorax and abdomen above black, strongly mixed with reddish, the abdomen entirely reddish beneath, segments 4, 6 and in ♂ also 7 with reddish dorsal belts. Legs predominantly vermilion. Anal brush black above mixed with reddish hair, reddish beneath. Moreover, the antenna has rather long cilia and bears at the tip a rather long bristle. Otherwise distinguished from *masariformis* and allied Asiatic species by the red colouring. — Only 1 ♂ from Saissan in the Tarbagatai.

bibioniformis. **Ch. bibioniformis** *Esp.* (51 i). Larger than *annellata*, expanse 19—23 mm, the colouring lighter. The forewing always with small whitish or yellowish streaks in the distal area. The outer vitreous patch larger, broader than high and 5-partite, the first spot and the last one being scaled with white. Longitudinal patch very distinct in ♂, vestigial in ♀. Distal border of hindwing narrow, cross-vein incrassate by scaling throughout, but posteriorly tapering. Fringes smoke-grey, whitish distally with the exception of the apex of the forewing, where they are always dark. Antennae suffused with yellow outwardly, with short cilia in ♂, without spiniform processes; basal segment yellow or white beneath. Palpi white, the end-segment, in ♂ also the middle one, streaked with black. Frons with metallic gloss and before the eyes 2 snowy white bands. Vertex blue-black, irrorated with yellow. Hind margin of head yellow above, white beneath. Dorsum of thorax with 3 whitish stripes, which are sometimes yellowish. Shoulder-spot of patagia white. The tufts of hair on the metanotum white. Abdomen usually with a dorsal line of whitish or yellowish spots, irrorated with yellow or whitish scales, and bearing white belts on segments 2, 4, 6 and traces of belts on 3, 5 and in ♂ also 7. On the underside segment 2 entirely white, the following ones either entirely white or with more or less distinct whitish hind edges, of which that of the fourth segment is broadest. Anal tuft of ♂ whitish or yellowish in the centre, striped with whitish or yellowish laterally at the base, beneath whitish or yellowish. In ♀ stronger and broader, similar to that of the ♂, but with two broad divergent dorsal stripes in the centre. Fore coxa glossy white. Tibiae whitish, the anterior one blackish on outside, the mid and hind ones rough-hairy, with *boisduvalii.* a broad black ring at base and apex. Tarsi yellowish white, usually dark above and on outside. — **boisduvalii** *nom. nov.* (= mysiniformis *Bdv.*), from Andalusia, according to Boisduval is darker, with the belts and the borders of the forewing broader, the abdomen devoid of a dorsal row of spots, and the coxae bordered with black on outside. — *Ch. bibioniformis* occurs in Central Germany (once found at the Kyffhäuser), Lower Austria, Hungary, Gouv. Pleskau, Roumania, East Roumelia, Turkey, Asia Minor, Southern Russia, Volga and Ural districts and the neighbouring countries of Asia, as well as Transcaucasia. According to Tomala the larva is dirty yellowish white, with blackish legs. Head densely hairy at the sides, less so on the frons; mandible stout, chestnut, with the base and tip deep black, the upperlip red-brown laterally, dirty white in the centre, and the clipeus transparent red-brown with dark brown sides and sharp white boundary line. Behind the head a small triangular sclerite; pronotal plate brownish. Dorsal vessel shining through, at each side a setiferous wart on every segment, above the spiracles 4 or 5 smaller and larger warts, two of which bear one bristle each. Some of the larvae hibernate twice in the roots of Tithymalus gerardiana; they tunnel at first downward, finally ascending to the top of the root and lining the end of the tunnel with silk; there occur also tubes made of wood-mould and sand, closed at the end and running above the ground, in which the pupa moves up or down according to the degree of moisture. Emergence of the moths from the middle of May until the end of August, mostly in July.

monspeliensis. **Ch. monspeliensis** *Stgr.* (52 c). Larger and darker than *bibioniformis*, with a large longitudinal patch in ♂ and a vestigial one in ♀. Outer vitreous patch smaller, rounded; distal wing-area with dull yellow streaks. Cross-vein of hindwing broadly scaled throughout. Palpi orange or whitish, striped with black on the outside, the end-segment being blackish. Vertex ochreous. Patagia with yellow inner margin and yellowish shoulder-spot. Antennae black, yellow on outside, basal segment rust-yellow beneath. Frons dark. Eyes anteriorly with glossy whitish borders. Abdomen dusted with yellow, segments 2, 4, 6 and in ♂ also 7 posteriorly with sharply defined yellow belts. On the ventral surface in the ♂ posteriorly rather distinctly continous yellow belts; in ♀ a large triangular yellow spot on segments 2, 4 and 5. Anal tuft yellow, black at the sides. Anterior coxa ochreous or whitish; mid and hind tibiae ochreous, with a broad black ring at the base and apex. — Southern France, Spain and questionably also Algeria; in May and June.

staudingeri. **Ch. staudingeri** *Failla* (50 l). Clumsier in build than *annellata* with broader forewing, and easily distinguished by the belts on the underside of the abdomen not being so distinctly continuous. Larger than *alysoniformis.* Forewing with a light spot at the base and two very small hyaline patches; wedge-spot vestigial, anteriorly bordered with pale yellow; outer hyaline patch tripartite. The small markings in the outer area very obsolescent. Cross-vein of hindwing strongly incrassate throughout. The eyes with white anterior border. Antennae black, yellowish on outside, first segment light yellow beneath. Palpi white, with a brownish suffusion on outside. Occiput with conspicuous yellowish brown tuft of hair. Median stripe of thorax vestigial; inner margins of patagia yellow. Abdomen black, with 3 golden yellow belts which are bordered posteriorly with glossy white and situated on segments 2, 4 and 6. Anal tuft black, yellow above in the centre. On the underside segment 1 whitish, the hind margin distinctly yellow on segment 4 and slightly yellow on the last two segments. Anterior coxa glossy white. Legs black; fore tibia streaked with yellow, mid and hind tibiae with whitish rings at the base and apex; tarsi dusted with yellowish scales. The species is further characterised by the costal edge being yellow in the last third in front of the outer vitreous patch. — Sicily (Miliuni, Ficuzza, in June).

haberhaueri. **Ch. haberhaueri** *Stgr.* (51 k). Larger than *alysoniformis* and as in that species without yellow shoulder-spot on the patagia. Forewing with 3 vitreous patches, of which the longitudinal one is short, in ♂ sometimes vestigial only; the wedge-spot larger than in *alysoniformis.* Outer area black, only in exceptional cases with a few yellow scales close to the margin; also the median band and the costal and hind margins without light scaling, only the costal margin bearing a light-coloured edge towards apex. The cross-vein of the hindwing rather strongly scaled. Antenna of ♂ very slightly notched, with very short cilia, blue-black, only the outside yellowish towards apex. Hind margin of head broadly orange, palpi white, only slightly blackish outwardly at the apex. Thorax with 5 yellow stripes, metanotum with yellow tufts of hair. The abdomen black, with the hind margins of segments 2, 4 and 6 yellowish white, in ♀ often these segments entirely yellow; small yellow dorsal spots are present, but usually indistinct. Anal brush of ♂ with thin whitish stripes in the middle, the median lobe laterally with yellowish stripes on underside. In the ♀ with 2 broader, divergent, more lateral yellowish smears, entirely dark on underside. The venter black, with segment 2 entirely whitish yellow and segments 4—6 bearing yellowish lateral spots. Fore coxa snowy white. Tibiae white and black; femora and tarsi dark. — Taurus.

alysoniformis. **Ch. alysoniformis** *H.-Schäff.* (51 k). Distinguished particularly by its small size (expanse 13—18 mm), the very small vitreous spots, of which the longitudinal one is absent in both sexes and the wedge-spot very short. Outer vitreous patch rounded, tripartite, the first spot being sometimes covered with scaling. Costal margin not pale-edged before the apex; outer area dark, with 2—4 small yellow spots in the cellules. The cross-vein of the hindwing widened anteriorly, pointed behind. Scaling on outer surface of antennae ochreous. Palpi yellow, whitish at the base, with brown apical segment. Hind margin of head red-yellow. Thorax with 3 yellow stripes, of which the median one reaches only to the centre. Abdomen black, with a steel-blue gloss, without a dorsal line of pale spots, the hind borders of segments 2, 4 and 6 narrowly pale yellow, the borders widening laterally and the first two being continuous beneath, segment 5 with a yellowish lateral spot. Anal brush black, in ♂ on each side with a thin yellow or white longitudinae streak, which is only indicated in ♀. Fore coxa whitish; tibiae and tarsi steel-blue, the tibiae only in ♀ thinly yellow on outside and with some yellowish hairs in the middle and at the apex. Easily distinguished from *haberhaueri* by the absence of the longitudinal hyaline spot, the very small size of the other vitreous spots, the costal margin not being pale-edged before the apex, the yellow streaks in the dark outer area, the yellow abdominal belt of segment 4 being complete on underside, the absence of a dorsal line of spots, and the dark anal brush not being yellow in the middle; differs from *staudingeri* in the absence of the light shoulder-spot on the patagia. — Bavarian Palatinate (Speyer), Hungary, Dalmatia, East Roumelia, Greece, Western Asia Minor (Brussa) and Pontus.

empiformis. **Ch. empiformis** *Esp.* (51 g, h). Exceedingly variable in size; the commonest species of the genus. Forewing blue-black, dusted with yellow, with yellow streaks in the distal area. Palpi predominantly yellow. Occiput orange. Antennae black, suffused with yellow on outside. Thorax with a thin yellow median stripe and broad yellow inner borders to the patagia. Frons without white borders to the eyes. No shoulder-spot on the patagia. Segments 2, 4 and 6 above with yellow belts, behind which the hind edges are narrowly glossy white; the other segments above more or less irrorated with yellow; dorsal line of yellow spots indistinct. The ventral surface almost entirely dusted with yellow. Anal tuft very variable in colouring, being either black with yellow stripes, or sometimes predominantly yellowish orange. Legs yellow, the tibiae with black basal and apical rings; tarsi with blackish dusting. Cross-vein of hindwing tapering to a fine point behind. — A larger and darker form, from Transcaucasia and Morea, is **schizoceriformis** *Kol.*, *schizoceriformis.* in which the line of dorsal spots is more distinct in the ♂, the vitreous spots are smaller, often covered with yellow scaling, particularly in the ♀, and the hind tibia is more orange than yellow. — Likewise darker, especially in ♀, is **hungarica** *Tomala* *hungarica.* (51 h); it is more greenish black, with the wing-margins slightly dusted with yellow, usually less distinct yellow stripes in the outer area, dull yellow colouring of the palpi, and very dark abdomen, particularly in the ♀, the abdomen bearing beneath no or few yellow scales and in ♂ above a more distinct row of dorsal spots. The larva of this form was found only in Tithymalus lucida on sunny river banks which were not swampy; it makes a tunnel of mould and soil down into the damp portion of the ground, and moves in it up and down (as does also the pupa) according to the degree of dampness. — *Ch. empiformis* is distributed almost throughout Central and South Europe, the Ural district, Transcaucasia, Asia Minor, Siberia (Lepsa and Kuldja district); questionably also in Algeria. The egg is flat lentiform, red-brown, with very hard shell; deposited singly at the stem of the food-plant close to the ground, being only slightly glued on. The larva is bone-yellow, with broad, swollen thoracical segments, and sparsely clothed with grey hairs. Head yellowish brown, with darker frontal triangle, nuchal plate yellowish; fullgrown 18 to 21 mm in length. Hibernates once and lives until April or May, very rarely until July, in the larger rhizomes of Tithymalus cyparissias, esula and other species, in sunny places. According to Asmus also in Epilobium angustifolium. Pupates in the top of the rhizome in a cell lined with fine silk; pupa slender, golden yellow, with six — 8 light minute bristles on the stumpy anal end. Moth from the end of May to August, single specimens observed in September; flies round Artemisia and Tithymalus and can be caught on the food-plant at night.

floricola. **Ch. floricola** *Oberth.* (51 h). According to Oberthür differs from *empiformis* in the reddish base of the hindwing, the black fringes which are not lighter distally, but are white at the hindmargin of the hindwing, the black head with white palpi having a black outer edge, and in a white tuft of hair on the metathorax. Abdomen black on both sides, bronze-coloured, with a short whitish central stripe and a white spot laterally on segment 2. Anal tuft and legs black; hind tibia with yellowish ring in the middle; tarsi yellowish. — Algeria (Sebdou, middle of July).

astatiformis. **Ch. astatiformis** *H.-Schäff.* (51 h). The sexes very different, the ♂ usually larger than the ♀, and much slenderer than that of *empiformis.* Forewing brownish black dusted with yellow: outer area of ♂ pale yellow, crossed by dark brown veins and bounded with dark colouring on both sides, in the darker ♀ with two to four small light yellow spots close to the margin, or entirely dark. Cross-vein of hindwing in both sexes more broadly scaled posteriorly than in *empiformis.* Palpi of ♂ yellowish with whitish base, sometimes blackish on the outside; in the ♀ yellowish, or whitish and yellowish on the distal part, at most very slightly blackish on the outside right at the tip. Thorax with the patagia broadly edged with yellow, and narrow yellow median line in the ♂, which is fainter and often obsolete in the ♀. Frons dusted with yellow. Abdomen of ♂ very slender, strongly dusted with yellow, in the ♀ almost black with patches of yellow scales in the centre. Segments 2, 4 and 6 bear narrow yellowish white belts posteriorly in the ♂ and broad white ones in the ♀; segment 7 yellow in the ♂. Anal tuft black, in the ♂ striped with golden yellow in the middle and laterally, and entirely yellow below; in the ♀ above with two diverging yellowish median stripes, and yellowish below in the middle. Venter of ♂ entirely yellow, with white spots on the lateral edge, in the ♀ predominantly dark, with whitish lateral spots, those of segments 4 and 6 being most prominent. Legs predominantly yellow, tibiae with blackish rings at the base and apex, which however, are, often entirely obsolete in the ♂. — From Ratisbon, Bohemia, Lower Austria, Hungary, Spain, Portugal, Dalmatia, Roumania, Bulgaria, Eastern Roumelia, Southern Russia, Gouv. Kasan, Volga and Ural districts, and neighbouring Asiatic countries, Transcaucasia, Asia Minor, Tobolsk, Lepsa (Southern Siberia), Ili district, Altai to Chinese Turkestan (Aksu, here in aberrational specimens), from May to August. The larva lives in the roots of Euphorbia.

stelidiformis. **Ch. stelidiformis** *Frr.* (51 i). Antennae black, yellow on the outside, in the ♀ with a brown spot above before the apex. Abdomen with dorsal line of yellowish spots and white hindmargin to segment 4, which is strongly broadened into a spot laterally. Segment 2 with white lateral spots, the others mostly with whitish spots at the lateral edges. Anal tuft black, with yellowish lateral stripe, in the ♂ yellowish below in the centre, rarely also variegated with yellow hairs above. Hind tibia black, with yellowish stripe below; tarsi black at base. The outer vitreous area of the brownish black forewing consists of five spots, the three middle ones of which project distally. Median line of thorax is only faintly developed and sometimes absent. *icteropus.* In ab. (et v.) **icteropus** *H. Schäff.* (52 c) the wings and the abdomen are strongly dusted with yellow, and the anal tuft is predominantly yellow. From Fiume, Dalmatia, Southern and Eastern Russia, South Western Siberia, transitional forms also in Hungary; in the last locality occur also typical specimens of *icteropus.* — *Ch. stelidiformis* is distributed in Piedmont, Dalmatia, Carniola, Carinthia, Croatia, Hungary, Moravia, Roumania, Southern Russia, North Caucasus, Transcaucasia, Asia Minor, to Lepsa in the Siberian province Semirjetshensk, and the Kuldsha district. According to Tomala the egg is flattened, 0.3 × 0.35 mm, with the broader surfaces somewhat impressed, a small groove on the upper side; dark chocolate brown, with minute diagonally placed depressions, the raised edges of which have a golden gloss. It is deposited singly or in clusters of up to twelve on the stalk of the food plant. The larva emerges after a fortnight and according to Gartner is first white with pale brown head, having a dark forked line and similar mouth-parts; nuchal plate brownish with two rust-brown stripes. Dorsal vessel rust-brown, shining through, on either side of it a groove on each segment. Stigmata in depressions. Thoracical legs with strong coxae, rusty brown at the apex. In the spring the full-grown larva is stout, the head darker fox-brown with minute hairs; anal plate narrow, without gloss and also hairy. Above the white lateral edge there are three warts in a triangle, with a hair on each. Lives until April or May in the roots of Tithymalus epithimoides, in sunny places, especially if stone-covered, fullgrown in the stout rhizome, close beneath the rind of which is also the silk-lined pupal cell. Pupa golden brown, head with short sharp edge; the body with belts of sharp erect points, and the cremaster surrounded by four pairs of dark sharply pointed cones. The moth emerges from the end of May to July.

guriensis. **Ch. guriensis** *Emich.* (52 c). Larger and slenderer than *empiformis*, forewing with blue black edges, the costal margin being dusted with yellowish white, and the outer margin bearing five yellowish dot-like smears. Vitreous spots rather large; the longitudinal spot extends to the transverse band in the ♂; in the ♀ it is narrow and scaled with yellowish white; outer vitreous patch traversed by two to four yellow veins. Fringes smoky grey, yellowish white at the hind margin of the hindwing. Body blue-black, antennae dusted with yellowish white. Palpi yellowish white, strongly black-hairy on the outer side. Frons and collar yellowish red. Inner edges of patagia yellowish white. Segments 4 and 6 (in the ♂ also 7) of abdomen with yellowish white edge. Anal tuft black, yellow below in the middle. Legs black; hind tibia with a yellowish white ring. Tarsi yellowish white. Near *stelidiformis*, from which it is easily distinguished by the abdominal belts not being broadened into spots laterally, and by segments 4 and 6 (in the ♂ also 7) having a whitish edge. — Transcaucasia (Prov. Guria, July).

osmiaeformis. **Ch. osmiaeformis** *H.-Schäff.* (52 d). Considerably smaller than *stelidiformis*, 12 to 19 mm in expanse, and more brown in colour. The whitish posterior edge of segment 4 only very slightly broader in the centre and laterally, not forming triangular spots. Anal tuft yellowish brown, variegated with lighter hairs, without distinct basal stripes laterally; below in the centre variegated with yellowish. Tibiae brown, hind tibia in the middle yellow or whitish. Longitudinal area of forewing only indicated in the ♂; wedge-shaped spot very small. Outer vitreous area always much higher than it is broad, consisting of four or five small spots, narrower in the ♀. Cross-vein of hindwing strongly and evenly incrassate, pointed posteriorly. The very broad median band of the forewing deep black, without brown dusting. Antennae brown, golden yellow on the outside, in the ♀ almost entirely cinnamon-yellow. Palpi of ♂ white clothed with black hair on the outer side of the middle and basal segments, in the ♀ yellow, only blackish at the apex of the middle segment and on the end-segment. — From Sicily, Central and Southern Italy and questionably also from Dalmatia, in May and June.

mutilata. **Ch. mutilata** *Stgr.* Similar to *stelidiformis* but smaller (expanse 19 to 20 mm), hind margin of the fourth abdominal segment orange. Anal tuft black, right at the base with short orange stripes on both sides towards apex; below only orange at the tip. Tibiae bluish black, orange-yellow in the basal half, tarsi dirty whitish yellow. Forewing brownish black, slightly dusted with yellow. Longitudinal patch absent (♂); wedge-spot short, as in *alysoniformis*: outer vitreous area small, consisting of three transparent spots and thinly covered with yellowish scales: the small spots above and below the patch filled in with yellow scales. Outer border of hindwing broader than in *stelidiformis*; cross-vein strongly incrassate anteriorly as in that species, but quite thin posteriorly. Middle segment of palpi clothed with conspicuous long blackish grey hair; end-segment quite slender and very much longer than in *stelidiformis*. — From Samarkand, middle to end of July.

montis. **Ch. montis** *Leech* (51 i). According to Leech related to *stelidiformis Frr.*, but distinguished by the different abdominal belts. Expanse 25 mm (♂). Forewing with a deep black border, transparent wedge-spot and oval outer vitreous patch consisting of five spots. Median spot broad, black. The transparent hindwing has a black margin, which is broader towards the apex and narrower towards the anal angle. Body black. Abdomen ringed with yellow towards the middle and at the end. Head, thorax, legs, antenna and underside black. Underside of wings dusted with yellow along the costal and hind margins. — Japan (Oiwake, June).

ramburii. **Ch. ramburii** *Stgr.* (52 c). Abdomen uniformly smoky brown, with white posterior edges in the ♂ only on segments 2, 4, 6 and 7, in the ♀ on segments 2, 4 and 6, the middle one of which is not broadened into spots laterally. The white hind edges of segments 2, 6 and 7 are sometimes entirely absent in the ♂; sometimes the latter has more or less distinct white rings on all the segments. Anal tuft of ♂ yellowish above in the centre and very slightly laterally, entirely yellowish below, in the ♀ entirely dark. Segment 4 of ♀ sometimes with a few whitish scales posteriorly on the ventral side. Fore coxa dark, with narrow white outer edges. Tibiae of middle and hind legs dirty white with dark rings; tarsi smoky brown. Outer vitreous area oblong, consisting of five small transparent spots, the uppermost and lowest of which are never filled in with yellow. Longitudinal spot always absent in the ♀. Median band and outer area narrower than in *colpiformis*, the outer area with four or five obsolescent yellowish streaks at the outer margin. Antennae clothed with yellow scales throughout their length on the outside. Palpi dirty white, in the ♂ with a black edge below on the outer side. Frons glossy brownish black, with a few yellowish scales in front of the eyes. On the whole slenderer than *colpiformis*. Expanse 16 to 23 mm. — From Andalusia (on loamy fields, from the middle to the end of June). Castile (Cuenca, July).

agnes. **Ch. agnes** *Oberth.* (51 i). Allied to *ramburii*, brown dusted with golden yellow. Abdomen above with white posterior edges to segments 2, 4 and 6, only the middle one of which is however always distinct, broadened into spots laterally and divided by a small yellowish spot in the middle, while the other white edges are usually worn away. Anal tuft of ♂ with narrow yellowish stripes laterally towards apex and variegated with yellowish below in the centre, in the ♀ brown variegated with a lighter colour above laterally and below in the centre. Fore coxa of ♂ dark, often with a narrow white edge below, in the ♀ entirely white. Hind tibia brown, with a broad yellowish ring in the centre. Tarsi yellowish or brownish. Longitudinal patch of ♂ vestigial, that of ♀ absent. Outer vitreous area consisting of five spots, the uppermost and lowest of which are sometimes clothed with yellow scales in the ♀, the transparent spot is very considerably narrower in the ♀ than in ♂. Median band very broad, deep brown; the dull yellow streaks of the outer area are very obsolescent above, more distinct below. Apex of forewing with a white edge, very distinct in the ♂. Antennae golden yellow on the outer side, in the ♀ brownish yellow also above, sometimes entirely yellowish brown. Palpi similar to those of *ramburii*, whitish in the ♀ with yellowish or darker end-segment and upper part of middle segment. Frons either entirely dark (♂) or with yellowish or whitish scales before the eyes, which have almost the appearance of bands. Shoulder-spot of patagia distinctly yellow. A conspicuous feature is also the base of the hindwing, which is broadly brownish black (not reddish as in *floricola Oberth.*) and the hind-marginal fringes of which are lighter (sometimes conspicuously so, almost white, in the ♂), while usually the fringes are brown with the tips golden yellow. Perhaps this species is synonymous with *floricola Oberth.*; this cannot be decided with certainty from the inexact descriptions of the two species. — Algeria (Sebdou, beginning of May, Lambessa and Batna, July).

doleriformis. **Ch. doleriformis** *H.-Schäff.* (50 l). Especially distinguished by the orange-yellow hind and middle tibiae being clothed with thick tufts of hair and bearing a broad blackish brown belt before the apex. Median band of forewing very broad, outer vitreous area broader than it is high, distally merging into the yellowish cells of the outer area, marginal line dark brown. Cross-vein of hindwing very densely scaled anteriorly and tapering to a sharp point posteriorly. Frons whitish, with distinct white borders to the eyes. Palpi yellow, basal segment and lower half of the middle segment whitish. Antennae of both sexes black above, rusty yellow below. Thorax with narrow yellow median line and broad yellow inner edges of the patagia. Abdomen black, densely dusted with yellow, with obsolescent yellow dorsal spots, with whitish rings above posteriorly on segments 4 and 6 (in the ♀ also on 2), below usually dark with segment 2 yellowish white. Anal tuft black, variegated with yellow. Tarsi yellow. — From Dalmatia (Spalato), Macedonia, Corfu, Greece and Turkey.

colpiformis. **Ch. colpiformis** *Stgr.* (52 c). The hair on the tibiae is not so abundant and rough as in *doleriformis*, about as in a large *stelidiformis*, the tibiae being whitish or brownish, with darker ring before the apex; tarsi brown. Larger and slenderer than *doleriformis*, the vitreous patches larger and not covered with scales; longitudinal patch always present in ♂ and ♀, rather long in the ♂. Longitudinal streaks in the outer area whitish, the borders brownish black. Antenna of ♂ more strongly ciliate, especially at the base, on the outside (below) golden yellow in both sexes. Palpi white, rarely yellowish white, with longer hair than in *doleriformis*, in which they are also never darker on the outside towards the apex. Patagia with whitish shoulder-spot. Abdomen brown with vivid white posterior edges on segments 2, 4, 6 and in the ♀ also 5, and yellowish white, usually indistinct, dorsal line of spots. Venter dark, segment 2 often bearing yellow spots laterally or in the middle. Anal tuft with two narrow whitish streaks in the middle, and narrow whitish edges laterally, yellowish below in the middle; brown in the ♀, variegated with whitish. — From Lower Austria (Vienna), South Eastern Hungary (Jassenova), Southern France, Dalmatia, Greece, near Uralsk, in the Pontus (Amasia), North-Western Asia Minor (Brussa), Konia and Algeria, from June to August, in steppe-districts.

cirgisa. **Ch. cirgisa** *spec. nov.* (50 k). At Uralsk I found, together with *colpiformis Stgr.*, a very well preserved ♀ of a well marked new species which is most closely allied to *colpiformis* and is distinguished from it by the following characters: It is larger (expanse 26 mm), and still more deeply chocolate brown than *umbrifera*, not variegated with yellow. Abdomen with distinct yellow dorsal line of spots and narrow white posterior edge to segments 2 and 4; that of the latter is somewhat broader, and broadened into spots laterally. Venter uniformly chocolate brown. Anal tuft striated with yellow in the middle; the projecting outer lobes with yellowish edges on the outside and below. The legs are uniformly chocolate brown with the exception of the fore coxae, which have a white outer edge; only the tibiae bear a small white spot beneath; above they are uniformly dark, the hind tibia rather densely hairy, but not so tufted as in *doleriformis*. Palpi white, the end-segment brownish. Antenna brown, suffused with yellow, with black tip. On the forewing, which is edged with chocolate, there are only four whitish dots quite close to the margin. The longitudinal patch is quite short, the outer vitreous patch higher than it is broad, and consisting of five very distinct non-sealed spots, the upper one of which projects outward. The outer vitreous area is quite straight on both sides, rectangular, which is never the case in *colpiformis*. The broad median spot projecting rather pointedly inward. Fringes smoke brown, those of the hind edge of the hindwing dark chocolate, not light as in *colpiformis*. The cross-vein of the hindwing much more broadly scaled with chocolate and not so acutely pointed. This ♀ is also considerably slenderer than that of *colpiformis*. From Uralsk (4th July 1907), type in my collection. In a ♀ from Sarepta the antenna, palpi, fore coxa, bands and tufts of hair on thorax, dorsal line of spots and ring of hind tibia are white.

umbrifera. **Ch. umbrifera** *Stgr.* (52 c). Distinguished from all the species by the margin of the hindwing being remarkably broadly scaled, and connected with the large square median spot at the cross-vein by means of cells 2 and 3 being also scaled. On the forewing the longitudinal patch is absent, the wedge-spot is obsolescent, and the outer vitreous area small and oval, consisting of three or four spots. Antennae of ♂ very stout, strongly ciliate. They are brown with the exception of the black apex and only in the ♂ bear a white spot before the tip. Abdomen with a white posterior edge to segment 4, which is not broader laterally. Anal tuft laterally whitish at the base and below in the centre; mid and hind tibiae broadly suffused with white in the middle, otherwise brown. — Only from Corfu.

Ch. lanipes *Led.* Resembling *doleriformis* in the tibiae being clothed with thick furry hair; the tibiae are, however, not orange yellow but white, and bear a blackish ring at base and apex. Tarsi brownish with lighter rings. Forewing blackish brown, and, with the exception of the median band, dusted with whitish speckles. Outer area with four or five small whitish spots. Outer vitreous area traversed by four veins, the upper and lower ones of which touch the ground-colour. The dense scaling of the cross-vein of the hindwing only extends to vein 5. Antennae blackish brown, in the ♂ stout and with rather long cilia. Thorax clothed with whitish grey hair, with light inner edges to the patagia; abdomen dull blackish brown, segments 2, 4 and 6 edged with white posteriorly; the other segments with narrow obsolescent yellowish brown hind edges. Anal tuft blackish brown, whitish below and at the sides. Distinguishable from *colpiformis* by the hind tibia being clothed with furry hair, by the yellowish brown edges of segments 3, 5 and 7 and the anal tuft having no light stripes in the middle. According to REBEL allied to *bibioniformis*, but differing especially in the hind tarsus being much less spiny, and in the hairs of the hind tibia more tufted. — From Eastern Roumelia (in the higher ranges of the Balkan Mts.). *lanipes.*

Ch. pernix *Leech* (51 k). Forewing reddish brown, lighter and semitransparent towards the disc and at the base; outer vitreous area not present. Hindwing transparent with the outer margin and fringes dark. Head black, palpi and collar light yellow. Antennae with reddish apex. Thorax and abdomen black, the latter with two narrow light yellow belts near the anal tuft and two broader belts, one of these towards the centre, the other at the base of the abdomen. Anal tuft apically variegated with white. Legs black with slight pale markings. Underside of forewing lighter than the upper. — Japan (Shimonoseki, July; Oiwake, June). LEECH placed the species into the genus *Bembecia Hbn.* *pernix.*

Ch. leucopsiformis *Esp.* (51 k). With a conspicuous yellowish dorsal line of spots and with a white posterior edge only to the fourth segment. Patagia broadly yellowish on the inner side; a narrow median thoracical line present. Frons dark, without white borders to the eyes. Palpi white with darker end-segment. Antennae blackish brown, yellowish on the outer side, in the ♂ strongly dentate and ciliate. The white hind margin of segment 4 somewhat broader laterally and extending on to the edges of the other segments. Ventral side also with an indistinct yellow line of spots. Anal tuft of ♂ narrowly striped with yellow in the middle and at the sides, median tuft whitish below laterally; that of the ♀ black-brown slightly variegated with whitish, with two whitish lateral stripes below. Fore coxae white, dark on the inner side, legs brownish black, tibiae of the last two pairs white on the outside. Wedge-shaped patch vestigial in the ♀, longitudinal patch only present in the ♂; outer vitreous area consisting of three small spots, more rarely of five, onethird broader than it is high. Outer area usually with yellowish white, rather conspicuous streaks. The ♀ is much darker than the ♂. From Germany, Neuchatel, Aargau (Switzerland), the Tyrol, Bohemia, Lower Austria, Hungary, Galicia, Bulgaria, Roumania and Tuscany; always very local and rather rare. — Larva cylindrical with the thoracical segments rather swollen, ivory white, with a dark dorsal vessel shining through and minute hairs on the small dark warts. Head reddish brown with small lighter bristles; nuchal plate light brown. The teeth at the inner side of the mandibles rounded and standing nearer the apex. Annual, hibernates when young and lives until the end of July or beginning of September in the roots of a Euphorbiaceae (Tithymalus cyparissias), only on sandy soil, makes a silk-lined tubular tunnel of wood-mould along the root and up to the surface of the earth; it pupates in this tunnel or in the top of the root, the pupa being yellowish brown and lying very near the surface of the ground. The moth flies at the end of August and in September, the species being the latest of those inhabiting Central Europe; often obtained with the sweeping net off Euphorbiaceae in the evening. *leucopsiformis.*

Ch. crassicornis *spec. nov.* (50 m). While *leucopsiformis* appears from the end of August to September, I found a closely allied species at Uralsk from the beginning to the end of July 1907 which differs from it in the following particulars: Outer area of forewing longer, consisting of 3 spots; cross-vein of hindwing more densely scaled. Antennae of ♂ with decidedly longer cilia, lighter brown above, in the ♀ yellowish brown with a tuft of whitish bristles at the apex; those of the ♂ are longer in comparison with those of *leucopsiformis,* extending beyond the median band. Palpi similar to those of *leucopsiformis*, but the hair shaggy in the ♂, and in the ♀ thicker than in the ♀ of the preceding species. The colour of the scaled patches and of the body is lighter brown; the abdomen especially is strongly variegated with whitish and yellowish specks; it bears a vestigial white hind edge on segment 6 and similar traces on other segments. Anal tuft quite light yellowish below in the centre. Anterior coxae entirely aenescent, or also white on the outer side. The wedge-shaped patch of the forewing is longer in the ♀ than in the *leucopsiformis* ♀. The outer area always with distint whitish yellow streaks. Usually another small vestigial transparent spot above the outer vitreous patch. *crassicornis.*

Ch. armeniaca *Bartel* (50 l). An exceedingly slender species, with very narrow, long and pointed forewing, resembling *leucopsiformis Esp.* in the light dorsal line of spots, but not related to it. Its proper place in classification is near *triannuliformis Frr.*, this being indicated especially by the white anterior borders to the eyes, the shape of the anal tuft, and the antennae, which are dark on the outside, etc. The differences *armeniaca.*

between it and the species mentioned are noted in the following description: Expanse: 17 mm (♂). Wings exceedingly narrow, forewing running into a point, with brown margins and the veins densely covered with yellowish scales. The vitreous patches are much smaller than in *triannuliformis*, the longitudinal patch is quite vestigial, the wedge-shaped spot verry short, extending only a short way beyond the edge of the basal area. Outer vitreous area only slightly lighter, reduced to three small spots, because the yellow scaling of the outer area covers part of the vitreous cells. The transparent patches of the forewing are also densely covered with whitish scales, so that they do not appear so transparent as in *triannuliformis*. The median spot appears shorter, the costal marginal area beyond it more widely scaled. A small marginal stripe of both wings is brown; fringes brownish grey. Cross-vein of hindwing only slightly scaled in its upper half. The hindwing also appears relatively narrower and longer, not so much rounded, especially the outer margin is more oblique and the anal angle appears almost angulate. On the underside of the wings the veins and the scaled parts are clothed with golden yellow scales, only the median spot and the costal marginal area beyond it are dark brown. Palpi similar to those of *triannuliformis* in shape, whitish yellow dusted with golden yellow, end-segment brownish on the outside, antennae with a small golden yellow spot below at the base, with fine cilia (♂). Frons with a golden gloss, anterior borders of eyes a glossy silvery white. Vertex with yellowish hair, as is also the posterior edge of the head. Patagia with a broad golden yellow inner edge; a long transverse spot (tuft of hair) of the same colour on the metathorax. Abdomen densely clothed with golden yellow scales (especially segment 1 almost entirely golden yellow), so that the dorsal line of spots is not especially prominent. The white belts also are not much in evidence, they are present on segments 2, 3, 4, 6 and 7, but are usually covered by the golden yellow scaling; they extend to the ventral side, but do not meet below. The first four segments are striped with golden yellow beneath, otherwise the underside is dark. The anal tuft is almost slenderer than in *triannuliformis*; it is predominantly golden yellow, only the long narrow lateral lobes are dark, but have a golden edge laterally. Breast entirely golden. Legs brown, with a golden gloss. Fore coxae with golden yellow spots at the end. Tibiae with golden yellow rings, these being broadest on the the hind tibia. — Russian Armenia (Kulp, June 30th 1901). Type in my collection.

triannuliformis. **Ch. triannuliformis** *Frr.* (51 h). Frons with white bands before the eyes. Antenna of ♂ strongly ciliate, that of the ♀ with a white spot before the apex; not suffused with golden yellow on the outside in either sex. Abdomen with very distinct dorsal line of spots. Facies very narrow, especially in the ♂; segments 2, 4 and 6 with white posterior edges. Anal tuft black, median lobe of ♂ broadly yellowish below at the apex, and faintly so at the base above, sometimes entirely yellow on both sides; lateral lobes very long and divergent, black with a narrow yellow basal line on the outside. In the ♀ it is slightly variegated with yellow in the centre above and below, but sometimes predominantly yellow and only variegated with black. Fore coxa yellow or white with a black inner edge. Outer vitreous area of forewing higher than it is broad, consisting of five small spots; longitudinal area of ♂ long and narrow, of ♀ short but never obsolete. Scaling of tranvserse vein of hindwing broad, but very pointed posteriorly. Palpi yellow, in the ♂ black on the outer side. Thorax with narrow yellow median line and broad yellow inner edges to the patagia. From North, Eastern and Central Germany, the Baltic provinces, Gouv. Pleskau, South-Eastern France, and from Austro-Hungary through Dalmatia and the whole of South-Eastern Europe to Northern and Central Asia Minor and Mesopotamia, also from Western and South Russia, the Volga district, Orenburg and Transcaucasia. — Egg elongate-rotundate, rather flattened on both sides, black with a bronze-like green gloss. Larva at first greasy white with abundant hairs and honey-coloured head. After five weeks the retracted cordiform head becomes rust-brown, the nuchal plate brownish white, shaped like a truncate hood, with two diverging impressions. In the autumn the larva is slender, dirty white, tinged with brown, with a white contrasting lateral line; the dorsal vessel, which shines through, is interrupted by the white edges of the segments. Lives at first in the lower part of the tap-root of Rumex acetosella, and then, gnawing away the tissues of the root, makes a spiral-shaped silk-lined tunnel upwards under the bark. In the spring one finds it in the upper part of the tap-root, before pupating it descends a little way, and makes a tubular silk-lined tunnel, an inch or an inch and a half long, ascending to the surface of the ground, its end being rounded. Pupa slender, brownish yellow, with short beak-shaped apex of the head, which is brown like the belts of spines on the abdominal segments and the edge of the wing-cases; the latter reach to segment 7 and the leg-cases to segment 8 inclusively. Anal portion with several sharp, lunular tubercles with brown edges, at the top of each of which is a bristle. The moth appears from the middle of June to the beginning of August, in the south already from the beginning of May.

mannii. **Ch. mannii** *Led.* (51 h). Stouter than *triannuliformis*, also usually smaller, especially the ♀. Outer vitreous area very small, consisting of 4 or 5 spots which are almost linear in the ♀, lowest and highest spot usually filled in with yellow. Cross-vein of hindwing relatively more densely scaled, pointed posteriorly. Antennae black above. Dorsal line of spots of abdomen yellow in the ♂, orange in the ♀. Segments 2, 4, 6, and in the ♂ also 7 with light posterior edges. Anal tuft of ♂ black, median lobe above with a narrow yellow longitudinal stripe on both sides, below golden yellow, in the ♀ the anal tuft quite black, sometimes with a few golden yellow hairs laterally. Each segment laterally bears a small light yellow spot in the ♂ and a golden yellow one in the ♀; below the abdomen in dark. Legs stouter and the tibiae much more densely hairy than in *triannuliformis*. Tibiae golden yellow with broad blue-black ring at the base and apex. Tarsi blackish or yellowish. The wings are much shorter, more broadly and strongly rounded than in *triannuliformis*. — From European Turkey and Bithynia, in June. The egg is elongate, brown, in shape and colouring resembling the cocoon of *Las. quercus*.

muscaeformis.
occidentalis.

Ch. muscaeformis *View.* (51 i). Antennae of ♂ with spiniform processes at least on some segments, not suffused with golden yellow on the outside in either sex, in the ♀ with a white spot before the apex. Outer vitreous area of forewing usually longer than it is high, with the exception of the short anterior spot, consisting of 4 or 5 spots. Longitudinal patch of ♀ usually scaled. Frons with white bands before the eyes. Abdomen with dorsal line of spots, edges of segments 2, 4 and 6 whitish and in the ♂ the edge of 7 yellowish. Anal tuft black, in the ♂ with narrow yellow lateral line, and yellowish below in the centre; in the ♀ predominantly yellow, especially below. Outer area of forewing indistinctly striped with yellowish white. Thorax with yellowish median streak. From Germany, Switzerland, Bohemia, Austro-Hungary, Dalmatia, Roumania, Piedmont, France, Belgium, Great Britain, Denmark, the whole of Russia (with the exception of the extreme north), eastward to Kasan, the Kuban district, Transcaucasia, and perhaps also North-Eastern Asia Minor. In Western France (Vannes) the species is represented by var. **occidentalis** *Joannis*, the scaled parts of the wings and body are so strongly variegated with yellow that the dark ground-colour, which is more brown than black, is little in evidence; streaks in the outer area of the forewing more numerous, larger, and always distinctly present. Antennae suffused with whitish on the outer side. Dorsal line of spots of abdomen always distinct. Anal tuft of ♂ striped with yellow in the centre also, in the ♀ more strongly variegated with yellow, sometimes entirely yellow. — Larva yellowish, with single small hairs, a dark dorsal vessel shining through, brownish muchal and anal plates, and reddish brown head, with a darker triangle on the frons, the mandibles bearing rounded teeth. Fullgrown 19 to 20 mm in lenght; annual, until the middle of May in sandy places in the older plants of Armeria vulgaris, pupation taking place in the top of the root. According to Asmus, in Russia also close to the root in the stems of Calluna vulgaris, where it is fullgrown already at the end of September. Pupa yellowish brown, wing-cases lighter, with rather prolonged leg-cases. It is easy to recognise the presence of the larva by the yellow and dry look of the plants. The moth appears from June till August.

leucomelaena.

Ch. leucomelaena *Z.* (51 i). As in *muscaeformis* the outer area of the forewing very large and consisting of 5 spots; but only segments 4 and 6 of the abdomen narrowly edged with white. Anal tuft of ♂ blackish blue above, with narrow yellowish white lateral stripes, yellow below in the middle; in the ♀ entirely blackish brown, rarely slightly variegated with whitish yellow hairs. Thorax without yellow median line. Outer area of forewing with whitish or pale yellow scales, which are less numerous in the ♀. Abdomen of ♂ with indistinct small dorsal spots. Slenderer than *muscaeformis*, and distinguished from it by the pure white colour of the palpi and fore coxae, and by the abdomen and outer vitreous area. — From Aargau, Carniola, Hungary, Dalmatia, Central Italy and Sicily, Andalusia, Greece, Roumelia, Turkey, Northern Asia Minor and Algeria, in June and July. Larva in the roots of Tithymalus cyparissias.

corsica.
venetensis.

Ch. corsica *Stgr.* (54 i). Distinguished from *muscaeformis* by the very broad bands and edges of the forewing, on account of which the vitreous patches are much reduced, the outer rounded vitreous patch always only consisting of three small spots, which moreover are sometimes partly scaled with yellow, the larger white spot on the antennae of the ♀, the often absent white abdominal belts, and the predominantly dark anal tuft, which in the ♂ is variegated with yellow hairs laterally and usually also in the middle, the hairs not however reaching to the apex. Fore coxa from snow-white to straw-colour, in the ♂ always with brown inner margin, which colour sometimes predominates. From Corsica, Central Italy, Sardinia and Sicily, Southern, Western and Eastern France, Spain (Murcia) and Portugal, from the end of May to July. — At Vannes in Western France the form **venetensis** *Joannis* (51 i) occurs which is only distinguished by the lighter, more smoke-grey, ground-colour, the more distinct rays of the outer area of the forewing and by the anal tuft being more strongly variegated with a lighter colour (also in the ♀). The larva is found at Vannes in the roots of Rumex acetosella.

mysiniformis.

Ch. mysiniformis *Ramb.* (51 k). Closely allied to *affinis Stgr.* Expanse 15 to 21 mm (♂, ♀). Wings with black-brown edges dusted with a light scaling. Forewing with a small wedge-shaped patch and rather short longitudinal area, which latter is, however, only present in the ♂, being altogether absent in the ♀. The outer vitreous patch is longer than it is high, and consists of three small spots, below which there is usually another small transparent dot. In a large ♂ in the possession of R. Püngeler a small transparent spot is indicated also in front of the patch. Median band rather broadly brownish black, strongly dusted with yellow scales, which are however very loose and easily fall off during flight. Costal margin with a narrow white edge before the apex. The outer area filled in between the veins with whitish or yellowish streaks, which are usually distinct. Marginal line black. Fringes of both wings smoky brown, and whitish at the abdominal margin of the hindwing. The latter with very broad cross-vein becoming more pointed posteriorly; sometimes this broadening only extends slightly below vein 5; marginal band fairly evenly brownish black, marginal line black. Underside lighter, with whitish borders, otherwise similar to the upperside. The veins of the hindwing are usually covered with light scales. Palpi white, the upper half dirty grey to blackish on the outside, with very pointed blackish end-segment. Head black with white bands before the eyes, edged with white below and laterally and yellowish posteriorly. Frons brass-colour, variegated with white to a great extent. Vertex black. Antennae black above, yellowish below; in the ♂ clothed with very short fasciculated cilia, slightly serrate; in the ♀ neither serrate nor ciliate, at most with a few hair-scales. Thorax smoky brown. with narrow light median stripe, which is however usually absent. Patagia with a distinct whitish inner edge, and very broad white stripes on the outside (at the breast). White tufts of hair around the metanotum. Breast brownish black with white spots. Fore coxa white with a black inner edge. Fore and middle femora blackish, white below; hind femur white for the greater part. Fore tibia dark, white beneath; middle and hind tibiae white, with dark spots before the apex, hind tibiae with black stripes on the inside. Tarsi smoke-brown more or less dusted with a light colour. Abdomen very like that of *bibioniformis Esp.* (with which the species cannot, however, be compared on account of the white abdominal belts not joining below); it is brown-black, and, as in the afore-mentioned species, bears a very distinct dorsal line of spots, which only becomes indistinct in worn specimens, and sharp white hind edges to segments 2, 4 and 6. By this dorsal line of white spots the species is easily distinguished from *affinis Stgr.* Anal tuft of ♂ very slender, consisting of two long lateral lobes and a short median tuft, but the former usually lie close together and are very closely compressed laterally; it is narrowly striped with white laterally at the base (in the upper half); median tuft to a great extent variegated with white, more rarely almost entirely white. Anal tuft of ♀ short, almost entirely dark, on the underside scarcely variegated with whitish. In a large ♀ in the possession of Herr Püngeler the anal tuft is distinguished by having a more or less distinct longitudinal stripe laterally above and below, and also is yellow below at the apex. The venter is usually dark, only rarely there are traces of small light median spots. The lateral edge of the abdomen is more or less distinctly striated with whitish; a prolongation upward of the central belt is always especially distinct. — The species is rather variable, besides size particularly in the purity and extent of the white colour. *Ch. mysiniformis* can only be compared with *affinis Stgr.*; it is distinguished from it by the shorter longitudinal patch of the ♂, the smaller outer vitreous area, the more whitish and always lighter colour of the cells of the outer area, by the antennae being yellow beneath, but especially by the sharp whitish dorsal line of spots, and the anal tuft of the ♂ being usually strongly compressed laterally, etc. Andalusia, Granada (on the inflorescences of Euphorbiaceae, etc.), Malaga, Sierra Nevada, Lanjaron, Castile (Cuenca), Algeria (Lambessa), the end of June and in July.

affinis. **Ch. affinis** *Stgr.* (51 k). Very variable in size. Distinguished from the allied species by the segments of the antennae having no spiniform processes in the ♂ and being unicolorous without spots in the ♀. Back only with two yellow stripes at the inner edges of the patagia, without median streak. Abdomen not dusted with yellow, in ♀ segments 4 and 6 and in the ♂ also 7 and partly 2 with narrow white posterior edges. ♂ with distinct yellow dorsal line of spots, ♀ without it. Anal tuft dark, in the ♂ with whitish hairs in the centre and laterally, which are however sometimes absent; in the ♀ variegated with white only above, especially laterally. Fore coxa white, black on the inner side. Tibiae white in the middle and at the end, on the outer side entirely clothed with white hair for two-thirds of their length. The outer vitreous area always broader than it is high, not rounded, as in *corsica*, consisting of three small spots. — In the Rheingau, South Germany, Alsatia, Switzerland, South Tyrol, Lower Austria, Hungary, Dalmatia, Piedmont, Southern France, Spain, Corfu, Greece (Morea), Roumania, Turkey, Transcaucasia and Northern Asia Minor. The larva lives in the stalk and root of Helianthemum vulgare, on which the moth may also be found on sunny slopes from May to the end of June.

albiventus. **Ch. albiventus** *Led.* (52 e). Antennae black, in ♂ strongly dentate and with spiniform processes. Frons with a metallic gloss, with few yellow scales below. Abdomen of ♂ very slender and compressed laterally, quite snow-white below. Segment 4 with a broad white hind margin, segment 6 with a narrow one. A yellowish dorsal line of spots. Cross-vein of hindwing as narrow as a hair posteriorly. Back with three pale yellow stripes. The outer vitreous area traversed by three veins, about one-third as broad again as it is high. The two inner vitreous areas present. Palpi snow-white with black end-segment. Anal tuft long and thin, black, with narrow yellow lateral stripe. Fore coxa white; tibiae white, black at the base and at the apex. — From North Western Asia Minor (Brussa) and Mesopotamia; according to Baker also in Mauretania (*aerifrons* ?).

aerifrons. **Ch. aerifrons** *Z.* (51 k). Frons with a metallic gloss, without white bands to the eyes. Palpi pure white below. Thorax with yellow inner edges to the patagia. Antennae blackish blue, in the ♂ without spiniform processes. Abdomen with a white posterior edge on segments 4 and 6 (in the ♂ also 7). Anal tuft black, in the ♂ whitish above and below in the centre. Fore coxa aeneous or whitish, mid and hind tibiae aeneous, without hair. Outer vitreous area rounded, consisting of three pots above or below it usually one or two small vestigial transparent spots. Cross-vein of hindwing entirely scaled, somewhat stouter anteriorly. — In the form *sardoa.* **sardoa** *Stgr.* the antennae are golden yellow on the outer side, and on segment 2 there is an additional white posterior edge. Fore coxa below entirely aeneous. — From ? Dalmatia, Hungary, Sardinia, Central Italy, Sicily, Southern France, Spain, Algeria, Tunis and Syria, during the last ten days of May and throughout June.

maurusia. **Ch. maurusia** *Püng.* (50 mm). „Expanse 17 mm. Near *aeriformis Z.*, outer vitreous area 5-partite, very narrow; cross-vein of hindwing more broadly scaled; patagia not edged with yellow; abdomen with three white belts which are open beneath as in *leucomelaena Z.*, from which *maurusia* is distinguished by the narrowness of the outer vitreous area, the shorter wings and the dark frons. — Algeria, Teniet-el-Had, 1 ♀, 1904 (M. Korb)." Type in coll. Püngeler. The above description has been kindly sent to me by Herr Püngeler.

azonos.

Ch. azonos *Led.* (52 d). Entirely black, with uniformly black palpi. Only the edges of the eyes, the collar, anal tuft below in the centre, and the middle part of the tibiae are pale yellow. Forewing with distinct outer vitreous area, which is round and traversed by three veins. Hindwing with narrow black outer margin. Abdomen uniformly black. Beyrut, Syria, in May. — The specimen found by Christoph at Ordubad in Southern Armenia probably belongs to this species and not to *Ch. anthraciformis.*

anthraciformis.

Ch. anthraciformis *Ramb.* (52 d). Distinguished from *azonos* by the outer vitreous patch of the forewing only consisting of three small spots, and the body being everywhere entirely black without any lighter parts. — In Corsica and Sardinia, in May. Larva probably in the roots of Tithymalus myrsinites.

fenusaeformis.

Ch. fenusaeformis *Led.* (51 k). Antenna of ♂ neither dentate nor ciliate, strongly club-shaped, in both sexes uniformly blue-black above. Hindwing produced at vein 1 b, and therefore conspicuously triangular. Its outer margin straight, its cross-vein as narrow as a hair throughout its length. Forewing very elongate and narrow, with the wedge-spot vestigial or absent and a very low outer vitreous area consisting of two transparent spots; very rarely there is another minute vitreous spot. Frons with small white spots before the eyes. Patagia with light shoulder-spot. Abdomen with yellowish or whitish belts on segments 2, 4 and 6, which are entire ventrally. Anal tuft black, with narrow yellowish stripes laterally, in the ♀ also yellow below at the base. — From Crete, Bithynia, Smyrna, the Cilician Taurus and Mesopotamia in May and June, flying around Rumex.

9. Genus: **Weismannia** *Spul.* (1910).

The only species of the genus occurs in the steppes and is of a remarkably slender build, the abdomen exceedingly slender and thin as in no other species, with a long fan-shaped anal tuft, the legs very long and thin, only the hind tibia at apex with rough hair, which is sparse. Antennae very thin, with well-developed club and tuft of hair at the apex. Tongue slightly developed, soft. Palpi smoothly scaled, very thin and slender. Wings broader towards the margin, especially the hindwing, the transparent patches covered with whitish scales, not so strongly on the hindwing. Venation as in the preceding genus, but veins 10 and 11 of the forewing farther apart at their origin and merged together in their last quarter. On the hindwing the costal marginal vein is farther away from the next vein, 3 and 4 are on a short stalk, the submedian veins similar to those of *Chamaesphecia.*

agdistiformis.

W. agdistiformis *Stgr.* (51 i). Vitreous patches of wing densely clothed with whitish scales, and those of the golden brown forewing small; the outer one only crossed by one or two veins, the longitudinal spot not indicated. Hindwing very broad, with wide diffuse golden brown border and brown, evenly broadly scaled cross-vein. Antenna comparatively short, slightly ciliate. Thorax with median stripe; patagia with broad whitish inner edges. Abdomen exceedingly thin, with indistinct whitish rings, golden brown, with golden yellow anal tuft, which is whitish laterally and below. The cells of the outer area of the forewing with two or three whitish yellow streaks, which are rather prominent. The unknown ♀ is possibly short-winged. — From Sarepta and Uralsk; I caught it from midnight onward at the lamp from the middle to the end of June in the steppes of Uralsk. Larva probably in the roots of Artemisia or grasses of the steppes.

10. Genus: **Tinthia** *Walk.* (1864).

Antennae thin, and serrate in both sexes, scarcely widened at the apex. Palpi slight, erect. Legs with slight tufts of hair at the joints. Wings very narrow, the forewing with the venation similar to that of *Synanthedon Hbn.* On the hindwing veins 3 and 4 originate from a point before the apex of the cell, 6 and 7 from the upper cell-angle, cross-vein almost straight. — Type: *T. varipes Walk.* from Celebes.

editha.

T. editha *Butl.* (52 f). Forewing chocolate; an interrupted longitudinal line stands at the apex of the cell, and two or three discal spots are transparently white, with brown veins and edges. Hind margin yellowish. Body brown; abdomen with lateral basal stripe. Legs golden, with black bands. Beneath the margins of the wings as well as the entire venter are golden in colour. Expanse: 22 mm. — Japan (Yokohama).

constricta.

T. constricta *Butl.* (52 f). Forewing deep black with transparent whitish wedge-shaped spot and square outer patch. Hindwing transparent, whitish, with black margin and veins. Fringes brown. Forewing below with golden costal margin. Body deep black; abdomen with two slight golden yellow median belts, the middle of the anal tuft also being golden yellow. Venter with silvery bands. Thorax with silvery spots; legs striped with golden yellow. Palpi whitish. Antenna of ♂ pectinate. Expanse: 18 mm. — Japan (Yokohama, Nagasaki, in June).

11. Genus: **Microsphecia** *nom. nov.* (Paranthrene *aut.*).

Antennae setiform, pointed, without tuft of hair at the apex, with short cilia in the ♂ and scarcely any in the ♀. Tongue obsolescent. Frons very broad, eyes small, palpi compressed, clothed with sparse bristly hairs; end-segment short and pointed. Abdomen of ♂ slender, of ♀ stout, in both sexes with anal tuft, which is pointed in the ♂. Tibiae and first segment of middle and hind tarsi with erect tufts of hair in the middle and at the apex, the former with very long thin spurs. Forewing very narrow, broader distally, entirely scaled; veins 7 and 8 not stalked, 2 indicated as a chitinous fold, 1 almost entirely obsolete. Hindwing transparent, gradually covered with dark scales to the margin, with narrow straight transverse vein, veins 3 and 4 originating rather far apart, 4 from the lower angle of the cell, 2 close before 3, 5 and 7 strongly divergent; vein 1 c quite obsolete. Very small species, flying in the noonday sun and belonging more especially to the Mediterranean countries; only *tineiformis Esp.*, the genotype, which occurs in Hungary and Central Asia, extends somewhat more north of their true area of distribution.

tineiformis. *brosiformis.* **M. tineiformis** *Esp.* (52 f). Posterior edge of head yellow, forewing yellowish brown, outer area of forewing and hindwing dusted with yellowish. Shoulder-spot of the patagia yellowish. Segment 1 of abdomen with yellowish lateral spots. Hind tibia and tarsus whitish in the middle, black at the apex, tibiae with yellowish tufts of hair, which are most conspicuous on the posterior pair. From Hungary, Dalmatia and Southern France throughout the whole of Southern Europe, also in Algeria and Southern Transcaucasia. — In Asia Minor, Mesopotamia, Taurus, Central Asia, Algeria, Hungary, Transcaucasia and on the Balkan Peninsula also occurs the form **brosiformis** *Hbn.* (52 f), of which the outer area of the forewing bears three elongate small golden yellow spots, the abdominal segments 1 and 2 spotted with pale yellow laterally and segment 1 above entirely whitish with the exception of the hind margin. — Larva according to Rouast in the stalks of Echium vulgare and violaceum, in very dry sterile localities. Moth from April to the end of August, but usually in June and July.

hoplisiformis. **M. hoplisiformis** *Mann* (52 f). Also with pale yellow collar and uniformly yellowish brown forewing. Frons yellow, metathorax with yellow tufts of hair. The anterior half of the third segment and the three last segments of the abdomen are yellow above, the third also yellow below, but this colour paler and more extended than above. Tarsi of fore and middle legs yellow. The yellow abdominal belts are more distinctly yellow than in ab. *cingulata* of *myrmosaeformis*, together with which *hoplisiformis* flies at Brussa. — Only from Bithynia, Armenia, and Mesopotamia, in July.

myrmosaeformis. *cingulata.* **M. myrmosaeformis** *H.-Schäff.* (52 f). Larger, forewing uniformly brownish black, with a steely blue sheen. Head, thorax and abdomen entirely blackish blue, without light scales; only the posterior edges of the eyes, the basal and central segments and the inner portion of the palpi are inconspicuously scaled with dirty white. Tongue rather stout, rolled up. Thorax with small light spots. Legs blackish blue, fore tibiae golden yellow on the inner side, hind tibia entirely so, with blackish blue apical ring. — From Eastern Roumelia, Greece, Turkey, Asia Minor and Northern Mesopotamia, from May till the middle of June, rare. In the form **cingulata** *Stgr.*, from Greece (middle of May to the end of June in the Parnassus), also occurring as aberration, the abdomen is yellow in the anterior portion of segments 3, 5, 6 and usually also 7, and the tarsus of the hind leg is variegated with yellow and black. The hindwing is not so transparent as in *hoplisiformis*.

Alphabetical List

of the Palearctic forms of *Aegeriidae* with reference to the original descriptions.

* signifies that the form is figured at the place quoted.

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joannisi Cham. *le Cerf*, Bull. Soc. Ent. Fr. 1909, p. 118. *

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25. Family: Cossidae.

The „wood-borers" are a fairly natural group of moths, about whose various species on the whole very little is known. The family has no very obvious affinities with any of the Bombycids, and the characters which they have in common with the Hepialids, near which family the *Cossidae* are generally placed, prove at first glance to be mere secondary adaptations, which are no evidence of blood-relationship between the two families. Altogether more than two hundred species are known, which are fairly evenly distributed, one group (*Myelobius*), although containing gigantic forms, having been proved to be hardly separable from the Pyralids. But even the true Cossids appear to be closely related to the Microlepidoptera, viz. to the *Tortricidae,* although they may not be directly derived from them. Conspicuous characters are: first, the totally obsolete mouth-parts, the reduction sometimes leading almost to the disappearance of the tongue and palpi; secondly, very primitive venation, this being so regular that scarcely any part of the wing remains unsupported, even the inner-marginal vein of the forewing and an unusually strong intracellular vein being forked again: and, thirdly that in most genera that portion of the forewing which bears most of the pressure during flight is strengthened by the subcostal veins anastomosing. The frequent anastomosis of veins renders the wings remarkably stiff and hard, so that a specimen of *Cossus* emerging need not, like most Lepidoptera, bring its wings into a hanging-down position for development, but, resting on the horizontal ground, it holds its wings upright, in which position they expand completely, as observed by FRINGS in *Cossus cossus.* The rather long thorax is also very primitive, its third segment not being closely fused with the mesothorax, so that the bases of forewing and hindwing are rather far apart, and the wings would easily be dislocated if they were not supported, beside the very strong frenulum, by an inner-marginal lobe of the forewing and often a costal lobe of the hindwing, which lobes help to keep the wings in their natural position. This arrangement reminds us of the connection of the wings in Hepialids which originate so far apart that a whole network of supporting and cross-veins is needed at the hind margin of the forewing and the costal margin of the hindwing to prevent the hindwing from slipping over the forewing, a danger of which one becomes aware when setting *Hepialidae.*

The head is only moderately large and in the ♂♂ also consists almost entirely of the very large eyes, which closely approach each other on the underside of the head even though they do not exclusively form the head, as e. g. in the Hepialid genus *Oenetus,* where they almost touch, as in dragon-flies, only leaving a very narrow interspace. The antennae are very variable, being strongly developed in some Australian species, and in certain *Zeuzera* almost as much reduced as those of the *Hepialidae.* Tongue always atrophied, being at most a short thread quite useless for the purpose of taking food, but the palpi are very variously developed, being quite different in evidently closely allied species and of just as little taxonomic value in this group as the antennae. The body is always strong in comparison with the stiff hard wings, sometimes scarcely larger than that of a Psychid, sometimes of gigantic proportions. Thorax very stout, with a hard shell, mesothorax with short hair, prothorax and metathorax usually with longer and often tufted hair. Legs of medium length, very strong, with reduced tibial spurs, but sharp, large tarsal claws. — Larvae smooth, glossy, with minute warts and strong short bristles, flat head, strong mandibles, rings of hooks on the abdominal legs and remarkably strong muscles. The contraction of several thousand bundles of transversely striped fibres of muscles (which someone has taken the pains of counting in *Cossus cossus*) enable the larva to use great strength, which is a necessity for a larva feeding inside wood. They can pinch severely with their mandibles, and also defend themselves by squirting out an acrid liquid from a slit below the head. They bore enormous tunnels in the wood, and the very coarse frass becomes rotten, resembling wood-mould, and often has a characteristic odour which betrays the larva to the collector. The pupa has only loosely connected limb-sheaths, and bears strong rings of hooks on the abdomen, with which it pushes its way out of the cocoon. The moths usually fly very late at night and many are strongly attracted by light. The development of the larger species takes two years. All the moths become greasy so easily that it is advisable to empty the abdomen and to stuff it with cotton-wool. Moreover, black insect-pins should always be used, as otherwise verdigris develops to such an extent as to burst the thorax.

New Cossids are described nearly every year, so that the number of species is sure to increase considerably still, and even in the Palearctic Region we cannot regard the list as complete. Many species are rare; really common are only the *Zeuzera,* especially *Zeuzera pyrina,* large numbers of which often flutter around the lamps in America and Africa, and the very similar coffee-borer, *Z. coffeae,* which often does great damage in plantations. The species known up to the present are so distributed that the Palearctic and American Regions contain each about 50 to 60; the Indo-Australian region has rather more forms, and Africa as yet slightly fewer, but this will probably be altered when larger collections of *Heterocera* come from Africa.

1. Genus: **Duomitus** *Butl.*

This genus, consisting of about two dozen species, some of them gigantic, is distributed over all parts of the globe excepting Europe. They are certainly not only the largest but also the most typical representatives of the Cossid family; true wood-borers, with naked larvae resembling those of beetles. The caterpillars have enormous pincer-like mandibles, avoid the light, are long lived, massive in the dimensions of their body, and primitive in structure. Their exoskeleton is soft and elastic, as long as the sheltering walls of the tunnels in the wood protect the larva from external injuries, but becomes hard, a kind of armour, as soon as the insect emerges into the open air.

Head comparatively small; frons narrow, less than half as broad as the large and very prominent naked eyes. The palpi very small, horizontal, only the small cap-like end-segment projecting above the eyes. Tongue entirely absent as in nearly all Cossids. Vertex with shaggy broad tuft of hair, which is, however, only present in fresh specimens. Thorax robust, downy hair broadened into scales at the ends on the prothorax and patagia and on the basal segment of the abdomen. Antenna of ♀ simple, bipectinate in the ♂, with very long teeth in the basal half, apical half filiform. Legs of medium length, stout, without distinct spurs, but with strong apical claws, with which the insects can scratch as energetically as many beetles. Wings thick, coriaceous, in the ♂ resembling those of the Sphingids in shape, in the ♀ moderately broad with curved hind margin; wood colour, with light patches recalling lichens and markings resembling the grain of wood. Abdomen of ♂ slender, of ♀ heavy with the ovipositor capable of being extended 1 cm, back of abdomen clothed with felty hair.

Among all the Continents Australia with its primitive Lepidoptera has the largest number of species of *Duomitus*, the gigantic *D. lituratus Don.* and its allies being especially striking. The larvae live in the trunks of the great forest-trees, especially in the juicy species of Ficus, and often do a great deal of damage in timber. The moths rest by day, with the wings folded close to the body; the prothoracical tufts, crest-like in the live insect, and the anteriorly truncate tuft on the frons, imitate a splinter of wood, the similarity being often heightened by the white colour of the thorax resembling the end-surface. The moths fly late at night, and are strongly attracted by light. Such a heavy moth dashing against the closed window of a block-cabin is apt to startle the inhabitants, and specimens rushing about a room produce a rattling sound with their wings.

The moths become rarer at the boundaries of their areas of distribution, and it is very difficult to tell how many species enter the Palearctic Region. Three species probably extend across the southern boundary, but only one species has as yet been caught on Palearctic territory.

leuconotus. **D. leuconotus** *Walk.* (= persona *le Guill.*) (53 a). At once recognized by the white hairs broadened to small scales at the end, which clothe the thorax and back of the base of the abdomen. The wings are grey with dark marbling, and with variable white spots at the hind and outer margins and apex. Distributed from Kashmir over the whole Indian Empire to Ceylon, abundant nearly everywhere. — Larva when half-grown flesh-coloured, yellow anteriorly and posteriorly, with black spots behind the head. It bores in large numbers in the trunks of Cassia nodosa, making tunnels up to 2 cm in diameter, and according to Skelling over 30 were found in the trunks of quite young trees. Pupa dark chestnut, almost black, with orange segmental incisions, stigmata black edged with orange. In a cell of wood at the end of the tunnel. After 1½ to 2 months the pupa pushes forward, and the moth emerges, which seems to fly particularly in March and September. The small yellowish brown eggs are deposited in clusters on the trunks, especially in crevices; the larva takes 2 years to develop. The natives collect the insects on the tree-trunks as well as at the light, the insect coming to the street lamps in the towns.

The double prothoracical tuft completely covers and hides the head of a fresh specimen at rest, but is often absent in worn ♀♀. The natives call this insect French moth, a name whose derivation is unknown to me; perhaps it refers to the colour French grey (?). The ♂ varies considerably in size, and I sometimes caught specimens which were smaller than *Herse convolvuli*.

2. Genus: **Cossus** *F.*

Still more widely distributed than the preceding genus, as one species also extends over nearly the whole of Europe, and even to the North of Scandinavia. The chief points of difference from the preceding genus are its stout build, broader wings, the tibial spurs, which are present although slight, and especially the antennae, which are uniformly serrate (♀) or pectinate (♂) to the apex, while the antennae of the ♂♂ of both *Zeuzera* and *Duomitus* have long pectinations in the basal half, but are naked and setiform distally. It is as well to point out here that the antennae of *Cossus* have also been said to be the principal distinguishing character between that genus and the following *Holcocerus*, whose antennae (♂) are only flat shafts without real teeth or pectinations. But until the more minute anatomical structure of these antennae has been examined, one cannot really speak of a generic distinction, as gradual differences in the pectinations of antennae in closely allied forms, and even in individuals of the same species are not at all impossible. The absence of woods, the ubiquity of the foodplant, the uniformity of the locality may considerably assist the function of the antennae as an organ of search, and thus organs which were originally complicated may become simplified. We are therefore loth to keep *Cossus* and *Holcocerus* separate, and only do so in order to avoid anything in our essentially practical work which would disturb the previous arrangements in collections and literature, and render the work more difficult to use.

C. cossus *L.* (53c), the well-known Goat-moth. Forewing dark brownish grey, more or less clouded *cossus.* and suffused with a lighter tone all over, striated and grained with black. Central European specimens are lighter grey, more suffused with brown, and with the collar pale yellow. It is not clear from Linné's description whether he had such a Central European specimen or whether perhaps one of the darker and less watered form occurring in Scandinavia and Lapland was before him, which we figure as **stygianus** *Stich.* (53c). *stygianus.* It is very probable on account of the silky yellowish grey collar and from the fact that Linné has described very many European moths from Swedish specimens. If this could be proved, it would be advisable to name the Scandinavian form *C. cossus L.*, and the Central European one *C. cossus ligniperda F.*, for Fabricius's description certainly refers to a specimen of the Central European form, which is typical and abundant especially in Holstein and Denmark. However, all transitions to the ordinary form of *cossus* of Germany are found from the North-East to the South of Scandinavia, so that it would be inadvisable to separate the Northern form. — The same applies to the Algerian form, which is very common in North Africa wherever there are poplars and willows and has even been observed in South Africa (introduced ?). Our figure of a *cossus*-♂ (52c) represents this form, which is distinctly different from the Central European form. Wings much more mottled with lead-grey, the black striation continuous, especially conspicuous before the marginal area is a broad straight black line not broken up as in European specimens running from the costa towards the hind-angle; collar of ♀ nearly always silvery grey, only in a few specimens slightly shot with yellow; the lamellae of the ♂-antenna much longer, costa of forewing straighter, etc. In spite of these differences the insect should not be given a name, for among the very large number of specimens before me there is also a ♀ which hardly differs from European specimens, and which I should undoubtedly have considered as European had not I myself caught it at Batna among about a dozen typical North African specimens. — In its distribution from East to West more constant varieties of *cossus* appear. Of the South Russian form, **uralicus** *subsp. nov.* (= volgensis *Bartel* *uralicus.* *i. l.*) (53c) *) I have before me specimens bred by Bartel at Uralsk. The shape of the wings is already different, being much less pointed in the ♂ than in European specimens, and especially African ones; they are uniformly brown in colour. — In the South of Eastern Europe the form **balcanicus** *Led.* (53b) occurs, which *balcanicus.* scarcely merits a separate name, being almost exactly like the Swedish *Cossus cossus*, particularly in size and shape, but the colour is uniformly light grey instead of dark grey. — Very little different from the last named form is a form from E. Central Asia, which is before me from the Lob-nor from Bartel's collection and very similar specimens of which are also in Püngeler's collection at Aachen. A conspicuous dark shadow in the basal area of the hindwing is characteristic. Perhaps the name **mongolicus** *Ersch.* (53d) may be saved *mongolicus* for this form, for Staudinger and Rebel in their catalogue already point out that this name is erroneously placed under *Holcocerus*. — In the case of an Armenian specimen, named **araraticus** *Teich*, the author remarks *araraticus.* that the yellow colour of the collar is entirely superseded by the brown ground-colour; but the moth appears to be otherwise undoubtedly a *cossus* with a few Eastern and Southern characters. — The forms **hyrcanus** *hyrcanus.* *Christ.*, **funkei** *Röb.* and **fereidun** *Gr.-Grsh.* are unknown to me. In the last-named, described from Northern *funkei.* Persia, the prothorax and abdomen are said to be whitish, forewing white striated with blackish towards the *fereidun.* margin; the striae form four black bands: one basal, one submarginal and two median converging ones, the space between these two last dusted with blackish. Hindwing sooty black-brown near the base, lighter at the margin. Anal area clothed with yellowish white hair. Belong perhaps to the *aries*-group. — **hyrcanus** *Christ.* The ♂ is described as being greyish white, basal half darker, brown, a stripe interrupted in the middle and the striae dark brown, fringes broad, chequered with a dark colour, their basal half ochreous brown. Hindwing grey. Length of forewing 20 mm. Described from a ♂ caught at Sharud in May. It is not said in the diagnosis with which form this species is related, and no figure is given, so that it is impossible even to determine to which genus the species belongs. — The egg of *cossus* is comparatively small, hard, rough, yellow at first, brownish later; it is deposited with the aid of the long ovipositer in crevices of deciduous trees, especially willows and poplar. Larva flesh-colour with black head and brown back, and with very large strong mandibles. It lives in wood-mould from July to September, hibernates while rather small, and during the next year bores further tunnels, gnawing the wood into coarse splinters. The juice of the wood, of which there is very little, is their nourishment, and their frass is therefore surprisingly small and irregular in shape. When almost fullgrown it hibernates for the second time and in May pupates in a cocoon made of wood-splinters pasted together. Pupa dark brown with loam-yellow abdomen shaded with reddish brown; 2 short excrescences on the head; limb-cases very loose. Abdominal segments sharply defined, with belts of spikes. Moth in June

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*) I alter Bartel's i. l. name, because there would be two *volgensis*, if *Holcocerus* and *Cossus* should be united, of which one had to be altered as soon as the local form would be raised to the rank of a species.

and beginning of July. As the larva gnaws its way through cardboard and wood, it should be kept in tins or glass jars which are closed by wire-gauze; the larvae cannot climb up the sides of the glass, but can very cleverly construct a ladder of silk. As the caterpillars require a large amount of moisture, it is advisable to put into the glass an apple as well as the wood and sawdust. As regards the wood to be given we have a large range of species from which to chose. Willows and poplar are most favoured by them, but in some places I also found very old oaks riddled with holes, with numbers of pupal shells protruding from the holes. Frings found the larva in a Japanese Paulownia, and birches are also often attacked. The larva is also frequently injurious to apple and ash. Sometimes, moreover, the pupa-shells are found projecting from holes in conifers, in which case we must assume that the larva did not feed in this tree but bored into it for pupation, as they often leave the original tree for that purpose. A tree inhabited by *cossus* has a characteristic odour which renders it easy to detect the presence of the borer.

terebra. **C. terebra** *F.* (53 d). Similar to the preceding, especially to the forms from Western Asia and the Balkan Peninsula, but the hair of the thorax and abdomen more shaggy, the collar also grey, not silky, wings more minutely striated, the forewing darker in the basal half, lighter in the outer half, more uniform in colour, not watered, the hindwing uniformly light grey. Distinguished especially by the ♂-antenna, which has much longer pectinations than any form of *cossus*, and by the abdomen which is uniformly grey without bands above. — In Eastern and Southern Germany, but only as an advanced post and quite singly (the localities Uerdingen, Berlin, etc, are probably erroneous), more abundant in the Tyrol, at the Danube, in Russia, at the Volga, from Finland to Switzerland and from Digne (?) to Eastern Siberia, very sporadical and locally rare. Larva dirty light grey with a brown head and brownish yellow nuchal plate, full-grown in May, in Populus tremula, also in other species of poplar. Pupa dark brown, abdomen yellowish brown ventrally; three tubercles on the head.

colossus. **C. colossus** *Stgr.*, from the Tianshan, is at once distinguishable by its enormous size: even the ♂ is considerably larger than the ♀ of *cossus* and rivals specimens of the ♂ of the gigantic *Duomitus leuconotus*, which it also resembles in the type of colouring, especially the light coloured margin of the forewing. But it is at once distinguished from *Duomitus* by the regularly pectinate antennae, *Duomitus* having antennae similar to those of our *Zeuzera*, which are plumose proximally and naked, setiform, distally.

bohatschi. **C. bohatschi** *Püng.* (53 b). Considerably smaller than the preceding forms. Externally resembles *Holcocerus consobrinus*, but was placed with *Cossus* on account of the longer lamellae of the antennae. Upperside grey, almost entirely unicolorous, striated as in *C. cossus*, collar of the same colour as the thorax, but with light edges. — From Issyk-kul and Ili. The ♀ is considerably larger than the ♂.

stertzi. **C. stertzi** *Püng.* (53 b). This species differs from all other *Cossus* in the sand-coloured ground-colour with only slight traces of markings. Among other sand-coloured Cossids which I know only *Holcocerus sericeus* and *difficilis* are of the same size; these are, however, sprinkled with bright brown; *Cossus intractatus*, which is dusted with grey and, as Herr Püngeler suggests, is founded on a worn specimen of *Hypopta turcomanica*; *Dyspessa bipunctata*, which is also sand-colour, is usually smaller. — From the steppes of Anterior Asia: Merv.

tapinus. **C. tapinus** *Püng.* (53 a). Like the preceding in size, the wings broad from the base, the apex of the forewing less obtuse, inner angle rounded; mouse-grey, slightly watered with a lighter shade, beyond the centre a few darker and more prominent irregular transverse striae. Collar like the thorax in colour; the latter and the conspicuously long abdomen clothed with dense shaggy hair, and thereby easily distinguished from the smaller *modestus*. — From Merv and Askhabad. Our figure is taken from the type in coll. Püngeler, which was kindly placed at our disposal.

modestus. **C. modestus** *Stgr.* (53 a). Still smaller than the preceding, and therefore the smallest *Cossus*, as long as this genus is kept separate from the next one. In colour and markings almost exactly like *tapinus*, with the scales smaller, the abdomen not flat, but more conical, more pointed, with the hair more appressed. — From the Tianshan and Ili district.

acronyctoides. **C. acronyctoides** *Moore* (52 h). Undoubtedly closely allied to the preceding species and probably only the Indian representative of one of them; markings very like those of a small *terebra*, but also almost exactly similar to those of various *Holcocerus*, e. g. *vicarius* and *consobrinus*. The lamellae of the ♂-antenna strong, the species being regarded as a true *Cossus* on account of this; but the character probably only means that it inhabits wooded country and not the steppes. It is distributed in Anterior India; Palearctic speminens are somewhat lighter grey than Indian ones from the Nilgiris and were separated as a distinct species under *cashmirensis.* the name of **cashmirensis** *Moore*. Ganjan, Cashmir.

aries. **C. aries** *Püng.* (53 b). More strongly divergent from the type of *Cossus* than any other species. White with brown smears and minute but sharp striae on the forewing, hindwing brownish grey with the base light. The chief characteristic is the broad antenna with very long pectinations, similar ones occurring only in *C. colossus*. The type (from with our figure was taken) in coll. Püngeler came from Jerusalem; but the species seems to be widely distributed. A very large ♂ now before me is from Tunis, and one with rather dark markings from Biskra in Algeria. All three specimens are different on the underside, the Syrian one being blackish grey with lighter wing-base, the Tunisian one with strong dark markings and the Mauretanian one with scarcely any markings. When more material of this rare moth is available, one may perhaps be able to separate distinct local forms. A separate genus would then have to be erected, as in the case of *Holcocerus,* on account of the strongly divergent antennae.

C. saharae *Luc.* is placed into *Cossus* by the author with a ? As sufficient morphological characters are not mentioned, nor any reference made to any other species, it is impossible to picture the moth or to say whether it really belongs to this genus. The insect is described as whitish grey above dusted with grey in places, with two brownish greyish green bands, one of which is near the margin. Fringes intermixed with greyish brown. Forewing below lighter, bands distinct, placed as above. Hindwing above and below whitish grey with lighter fringes. Thorax greyish brown, abdomen grey, palpi setiform, grey, antennae dentate.— Oasis of Kebeli (Tunis), in May. 27 mm. *saharae.*

C. mauretanica *Luc.* Also unknown to me. Forewing elongate, with small yellow and dark brownish spots. A curved band runs to the apex. Between veins 1, 2 and 3 a distinct brown patch dentate in the centre. The reddish yellow spots near the thorax and margins. Underside whitish. Hindwing above whitish dusted with grey. Thorax yellowish red, abdomen long, greyish. Palpi short, white, porrect, tibiae white; antennae stout, brown. 29 mm. — One ♀, October in the Oasis of Kebeli, Tunis. *mauretanica.*

3. Genus: **Holcocerus** *Stgr.*

This almost purely Central Asiatic genus, only two or three forms of which enter European Russia, is in every respect an artificial group. Several of its forms (about thirty) are quite certainly here in the wrong place. The species represent all transitions from the *Cossus*-type inhabiting tree trunks to those living in herbs in the steppes and the desert forms of the genus *Paropta.* The genus was essentially based on differences in the antennae which, as the name indicates, appear prolonged, extended ribbon-like, without lamellae on the underside. But the antennae, which in the other families often are of great value in classification, are very variable in the Cossids. In some they are plumose in the ♂ (*Duomitus*), with lamellae (*Cossus*), and in others again quite simple (*Holcocerus*). The lamellae may vary in a genus, being quite short (*modestus*), or of medium length (*balcanicus*), or very long (*terebra, aries*). They even vary in specimens of one species, being much longer in the ♂ of the African *Cossus cossus* than in that of *C. cossus stygianus*-♂: and they are not even quite the same in ♀♀ of *Cossus cossus* from the same locality. In one species of *Holcocerus* — *H. pulverulentus Püng.* — they are produced into abnormally long ribbons, so that this moth cannot really be placed in any of the present genera. If an organ varies even individually in a group it is scarcely of any use in characterising a genus, and we should be obliged to arrange species among the Cossids according to the antennae in an order which would otherwise appear quite unnatural. As was already said with reference to *Cossus,* the shape of the antennae of the Cossids is probably an adaptation depending on whether the food-plants grow close together or far apart, whether the moth inhabits steppes or forests, and whether a prolonged search for the ♀ is more or less dangerous for the ♂. Very little appears to be known of the habits of the *Holcocerus*; Herr PÜNGELER, who has described several species, informs me concerning some species which inhabit the steppes that the ♀♀ were often found by "mothing" on the steppes, where they rest on stalks at night.

H. vicarius *Walk.* (53 d, only the ♀), has entirely the facies of a *Cossus,* was also described by WALKER as belonging to that genus without reference to the antennae, and like most *Holcocerus* should not be generically separated. Distinguished by the inner half of the forewing being sharply separated from the lighter outer half; the mottling and striation as in *Cossus cossus.* On the underside also the dark basal part of the wing contrasts with the lighter striated outer half. — Described from Shanghai, but occurring throughout Northern China, in Tsing-tau, Amurland and Japan; appears to be rare, northern specimens somewhat smaller than those from Shanghai and Japan, were lately named **tsingtauica** *Bang-Haas* (53 d, as *vicarius* ♂). *vicarius.* *tsingtauica.*

H. consobrinus *Püng.* (53 b). Undoubtedly allied to the preceding, a transition between it and the following species. The darker basal area only distinct on the forewing and individually very different on account of the variability of the ground-colour, often only recognisable on the underside. On the whole considerably smaller than the preceding insect, but the abdomen of the ♂ long and cylindrical as in that species, not flat with long-hairy sides as in *arenicola.* — In Central Asia, perhaps only the Western form of the preceding; from Ili, Kuldsha, Kissil-Jart. *consobrinus.*

H. arenicola *Stgr.* (53 d). Very closely related to the preceding, but the forewing almost uniformly grey, the striae more minute and delicate; abdomen flatter, clothed with dense long soft hair in specimens which are not spoiled by the pressure of the paper. The species of *Holcocerus* most frequently sent home and together with *volgensis* the only one entering Europe; in the steppes of Southern Russia and Western Asia, extending to Turkestan. As in *consobrinus,* the ground-colour varies considerably in tint; a very light specimen with the hindwing almost white was sent to me by Herr BARTEL as ab. **albida** (53 e). Northern speci- *arenicola.* *albida.*

insularis. mens from the Ussuri and other quite similar ones which I obtained through Klaphek from Jenehou-fu, are smaller and darker and described as **insularis** *Stgr.* (53 e), forming a direct transition to *consobrinus.*

drangianicus. **H. drangianicus** *Gr.-Grsch.* Closely allied to *arenicola,* but differing in size (37 mm) as well as colouring and markings. Forewing above dirty white marbled with black and with a network of striae, slightly darker in the middle, hindwing dirty white with darker fringes. — From Seistan.

ussuriensis. **H. ussuriensis** *Graes.* Also closely allied to *arenicola,* but somewhat slenderer, forewing more elongate, its hind edge less emarginate before the hind angle. Colour dark smoky grey, forewing lighter in the marginal area, the reticulation more minute than in the otherwise very similar *arenicola* and *Cossus terebra.* A light spot at the apex of the cell. Hindwing still darker, somewhat lighter in the cell, fringes with dark dividing line. — Described from a ♂ from the Ussuri.

putridus. **H. putridus** *Christ.* (53 b). Similar in size to *insularis,* but the wings broader, the outer margin less rounded, the hindwing larger, with longer fringes. Markings coarser than in *arenicola,* the colouring as dark as in *insularis.* — From Turan. Was described as a *Holcocerus* by Christoph, but placed in *Cossus* by Staudinger-Rebel in spite of the fact that the figure of the ♂ in Romanoff's "Mémoires" does not permit of any doubt as to the structure of the antennae, a proof of the artificiality of the separation of *Cossus* and *Holcocerus.*

mucosus. **H. mucosus** *Christ.*, not unlike *putridus,* but rather larger, forewing more dirty grey, all veins in the basal area prominently white and the median branches connected by a white transverse bar; there is also a white transverse bar running from the submedian to the hindmarginal vein. On the whole rather like *Hyp. caestrum.* — Askhabad, Nuchur, in June.

mus. **H. mus** *Gr.-Grsh.* Thorax clothed with grey hair, abdomen light mouse-grey, greater part of forewing above dirty white, densely dusted with mouse-grey and yellowish towards the outer margin, two but slightly distinct abbreviated oblique bands. Hindwing light mouse-grey, darker basally; all fringes chequered with white and mouse-grey. — Described from ♀♀, which measure 30 to 32 mm. From the Persian province Makran. Altogether six forms of *Cossus* have been described from Persia. But as each is described without reference to the others, as no morphological distinctions are mentioned, and, moreover, the authors had only one or two specimens, it is impossible to say anything definite about these forms, it being doubtful whether (according to the generic separation still holding good to-day) they really belong to *Holcocerus.*

praeclarus. **H. praeclarus** *Püng.* (53 e). From Tura. A larger and light species with ashy grey forewing and dull whitish hindwing. It is closely allied to the following, *pulverulentus,* but instead of the small streaks between the veins it has a submarginal line running parallel with the outer margin; the fringes of both wings distinctly chequered. But above all the antennae are not very long and whip-like as in *pulverulentus,* the abdomen of the ♂ is flatter and the anal tuft narrower. — From the steppes of Anterior Asia, from Merv. We figure the type from coll. Püngeler.

pulverulentus. **H. pulverulentus** *Püng.* (53 e). The differences are already mentioned under the preceding species; they consist especially in the very long pointed antennae and the comma-shaped spots between the veins, which are not always so distinct as in the figure. Underside dull white, in some specimens entirely without markings, in others with checks along the costa of the forewing. — Like the preceding from Merv.

campicola. **H. campicola** *Ev.* (53 e). Size and shape of *pulverulentus,* but the entire colouring dull greyish brown instead of light grey. The forewing somewhat broader at the apex, its outer margin, especially the hind angle, more rounded, the antennae moderately long. The stripes between the veins nearly as in *pulverulentus,* but difficult to recognise on account of the darker ground-colour, or may disappear entirely in the ground-colour. — Steppes of Central Asia, Turkestan.

volgensis. **H. volgensis** *Christ.* (53 e). Very like the preceding, and of the same earth-brown colour; markings and striation more distinct; especially in the marginal area there is a line consisting of small dark striae; chequering of fringes darker, as is also the costa on the underside of the forewing. Appears to be met with more frequentely only near Sarepta, whence our specimens also came. — The only *Holcocerus* found in Europe, excepting *arenicola.*

inspersus. **H. inspersus** *Christ.* (53 f). A small insect from Turkestan, resembling *Cossus tapinus* in facies, especially in the long abdomen. The forewing is a delicate silvery grey, slightly variegated with yellowish grey, and bears a few light dots, and often a somewhat larger one at the apex of the cell; hindwing almost pure white; the long fringes of the forewing chequered with bright brown. Antenna of ♂ comparatively long. — From Merv.

mollis. **H. mollis** *Christ.* (53 f). This species and the two following occur in Turkestan; they are true inhabitants of the steppes, and are most often found by collectors "mothing" at night or hunting for beetles or caterpillars on the tufts of grass of the steppes. Like the preceding, *mollis* is grey, forewing along the costa, median and submedian veins traversed by white longitudinal lines, the two upper ones anastomosing at the apex of the cell. Antennae very long, as in the preceding. Fringes chequered, abdomen much stouter.

gracilis. **H. gracilis** *Christ.* (53 f). The smallest species of the genus; forewing with transverse lines, a dark patch beyond the cell, ground-colour whitish grey variegated with greyish brown. Hindwing uniformly brownish grey. Fringes long, traversed by the dark veins. The antennae are two-thirds the length of the costa.

lucifer. **H. lucifer** *Gr.-Grsh.* Stout, forewing more stumpy at the apex and hind angle, grey marbled with a darker colour, with black transverse stripes and striae. Hindwing darker, light brownish grey, striae dark brown. — Described from a ♂ of 30 mm. from the Sinin Mountains. The species is not known to me, and the author's description is applicable to quite a number of forms.

strioliger. **H. strioliger** *Alph.* (53 f). Much stouter, larger and heavier than the preceding forms. Forewing whitish with a darker cloud in the disc, which usually encloses a prominent light cell-spot. The entire wing with sharp bright brown transverse striae, some of the latter merging together to form chains; hindwing dirty brownish grey, lighter below the middle of the costa, traversed by the dark veins. Head and collar yellowish or whitish. — From Central Asia.

nobilis. **H. nobilis** *Stgr.* (53 f). This species comes near to the preceding one in facies and size, but instead of the dark striae the forewing bears numerous golden brown dots and shadowy smears, which are merged together to form indistinct oblique bands and central smears interrupted by the whitish veins. From Turkestan. — *difficilis.* **difficilis** *Stgr.* (53 f), from Kushk, is a strongly divergent, usually smaller, form with very sparse golden brown dots, in which the smears of the forewing are suffused with pale ochreous and the hindwing with pale yellowish brown.

zarudnyi. **H. zarudnyi** *Gr.-Grsh.* Very closely allied to the preceding, but the abdomen is white with dark brown rings. Forewing more white, the shadowy dots arranged differently, not merging together. Abdomen almost white, without submarginal dot. 38 to 46 mm. — Persia, Province of Bampur.

sericeus. **H. sericeus** *Gr.-Grsh.* (53 g). Comes from the Pamir; one of the forms most often reaching us. Size as in the preceding; ground-colour white, the light ochreous colour distributed over the forewing in the shape of irregularly arranged minute dots, striae and specks; head and thorax of the same delicate yellow. Abdomen and hindwing dull white.

tancrei. **H. tancrei** *Püng.* (53 f). Wings white, with narrow golden brown veins. Beyond the cell between the veins there are 5 or 6 elongate ovate drop-shaped spots arranged as a chain; apex and fringes of forewing dotted with bright brown. Our figure of this magnificent and characteristic form is taken from the type from Merv in coll. Püngeler, which was very kindly placed at our disposal.

gloriosus. **H. gloriosus** *Ersch.* (53 g). Body and wings silvery white; forewing with ochreous dots in the cell, between and above the median branches and at the distal portion of the costa, where they may merge together to form a pattern. — From Turkestan.

faroulti. **H. faroulti** *Oberth.* (52 i). Very like *gloriosus* and may be considered as the North African representative of that species; white, the dots more dark brown than golden brown, and some of them arranged somewhat differently from those of the Asiatic *gloriosus.* — Only found a few years ago.

laudabilis. **H. laudabilis** *Stgr.* (53 g) is a very similar form from the Dead Sea, perhaps also a subspecies of *gloriosus,* smaller and with the ground-colour purer white than in that species. The bright yellow spots are lighter, smaller and somewhat more sparse, but before the apex they merge together to form a narrow oblique band. Sometimes they are all so pale and indistinct that a glimmer of them can be seen only in a certain light. Hindwing as in the preceding forms pure white.

holosericeus. **H. holosericeus** *Stgr.* (53 g), from Ferghana (Turkestan), is quite white, both wings with a bright silky gloss, vertex and anterior side of thorax slightly tinged with yellowish.

sacarum. **H. sacarum** *Gr.-Grsh* (53 g). This species and the following one, which probably do not belong to this genus, are much smaller than the preceding forms and are more like some *Dyspessa. H. sacarum* is greyish sandy yellow with lighter spots beyond the centre and an obsolescent yellowish submarginal band.

powelli. **H. powelli** *Oberth.* (52 h) is, next to *gracilis,* the smallest species of the genus; dull loam-grey, densely striated with dark brown in such a manner that the striae beyond the centre are grouped to form a darker spot and those in the marginal area a submarginal band. Length of forewing scarcely 10 mm. — Algeria, Tunis.

A small number of forms belonging to this genus still remain which were mostly described by Austaut, but which are not known to me in nature. We therefore append the names and localities. They are *persicus Aust., strigatus Aust., marmoratus Aust., iranicus Aust.* They are either from Persia (?) or from Turkestan. In Staudinger-Rebel's Catalogue they are all marked with a query. The other Persian or Turanian forms have evidently not been before the author. In answer to our inquiries the latter informed us that the types had been handed over to a dealer: it would therefore perhaps be best to suppress the forms, but for the sake of completeness we give their descriptions in the appendix.

4. Genus: **Cossulinus** *Kirby.*

This genus represents a distinct transition from the Cossid-like moths to *Hypopta.* The insect appears very stout on account of the unusually stout thorax and broad head. The stout and rather short abdomen, which, like the thorax, is clothed with dense thick fluffy hair, harmonises with the short forewing with its long fringes and rather smooth distal margin. The antennae are only moderately stout, but have the pectinations well developed though short. Only one species is known, from Asia Minor and Armenia, which gives one the impression of an albinotic *Hypopta.*

argentatus. **C. argentatus** *Stgr.* (53 h). Size like that of *Hypopta thrips.* Body and wings silvery white, legs also white, antennae yellowish brown. Forewing with a few small scales merging together in the centre of the wing to form a diffuse cloud; near the base of the forewing small yellowish brown scales. Hindwing very slightly tinged with grey, with narrow dark veins. — The species seems very rare; the figured specimen is from Konia.

5. Genus: **Hypopta** *Hbn.*

Very robust, with stout thorax, and with the abdomen of medium length in the ♂ and long in the ♀, produced into a projecting ovipositor. Head broad, eyes large, palpi short, stout, horizontally porrect, antennae very variable, bipectinate or lamellate in the ♂, likewise so or simple in the ♀; in many species the lamellae are developed to such an extraordinary degree that when the ♂ is on the wing the stout porrect antennae are distinctly visible, e. g., in *H. ambigua Hbn.* The hind legs are very strongly developed, and the tibiae clothed with long shaggy hair, with two pairs of spurs. Wings less stout than in *Cossus,* very broad with curved, only slightly oblique, outer margin and almost effaced hind angle. Forewing without areole. One-half of about two dozen forms inhabits the Palearctic Region, the other America. Many species occasionally appear in huge swarms and cover the panes of the lantern like swarming bees. In spite of this the life-history of only one species is known.

thrips. **H. thrips** *Hbn.* (= fuchsianus *Ev.*, kindermanni *Frr.*) (53 h). Sandy brown; forewing minutely striated, beyond the centre of the wing above the hind margin an ocellus-like brown mark with a light border. — In South Russia, Siberia and Armenia; once observed in Transsylvania (introduced ?); the ♂ swarms after sunset in the summer on fields studded with Artemisia.

turcomanica. **H. turcomanica** *Christ.* (53 h). In size and shape similar to *thrips,* forewing brownish yellow strongly variegated with grey. The brown disc with white border in the middle of the forewing is absent, there being only slight markings in its place; similar markings are arranged as a chain extending downwards from the *intractatus.* apex. **intractatus** *Stgr.*, originally described as a *Cossus,* seems to have been founded on a faintly marked or worn specimen of this species. — Turkestan.

zoroastres. **H. zoroastres** *Gr.-Grsh.*, closely allied to the preceding, but the antennae longer, almost as in *thrips,* bipectinate, white with small yellowish teeth. Forewing above white, marbled with yellowish, with dark basal band and costal area and an apical row of confluent dots. ♂ 27 to 34 mm. — Province of Makran, Persia.

caestrum. **H. caestrum** *Hbn.* (53 g). Size as in the preceding; the brown spot beyond the centre of the forewing indistinctly bounded and continued by small smear-spots to the costa; forewing from there nearly to the base pure white with slightly bluish silky gloss, which is sometimes faintly greenish, occasionally slightly *deserta.* changed in pathological specimens (ab. *teredo Bdv.*). The form **deserta** *Fisch.-Wald.* is much lighter, with fewer markings. In Southern Europe and Western and Northern Asia; South France, Austria, and Italy, *caucasicum.* Hungary, the Balkan Peninsula, Syria, Armenia; in vineyards and kitchen gardens. — In the form **cau-** *radota.* **casicum** *Gr.-Grsh.* (Tiflis) the marginal area of the hindwing also is whitish, while in **radota** *Homberg* (53 g), from the French Riviera (Cannes), the whole forewing is darkened to slate-blue. — Egg elongate-ovate, brown with lighter reticulation. Larva cylindrical, wiry, white with a brownish head, very much recalling that of *Aegeria apiformis*; in the roots of Asparagus, makes tubular cocoons of earth; pupates soon after hibernation, is said to be injurious to the Asparagus near Constantinople; pupa yellowish brown, with small dorsal hooks. The moth emerges in July. When on the wing the insect makes a distinct humming noise.

sibirica. **H. sibirica** *Alph.* (52 h). Considerably larger than *caestrum* and one of the most beautiful Cossids. The costal marginal area of the forewing is a magnificent silvery white as far as the marginal area; below and beyond the cell there is fine golden brown dusting. — North-East Siberia.

herzi. **H. herzi** *Alph.* (52 h). The same size as the preceding, but the colour of the wings more dark greyish brown, less intermixed with yellowish brown; light smear-spots in the costal area beyond the cell, below the cell and before the hind angle. — Turkestan: Samarkand.

vaulogeri. **H. vaulogeri** *Stgr.* (52 h). Very closely allied to the preceding, smaller and much lighter, especially the thorax and abdomen; head almost white; markings recalling those of *herzi*, only being sharper, the cell itself whitish in a dull light greyish-brown ground, hindwing dirty white with brown veins. — Algeria.

H. reibelli *Oberth.* (53 h). Much smaller than the preceding forms, like a small *Dyspessa*. Thorax and forewing light loam-yellow, costa, fringes, and an elongate spot in the median area of the latter ivory white, as is also the hindwing. — Mauretania. *reibelli.*

6. Genus: **Paropta** *Stgr.*

Closely allied to *Catopta*, but the head, thorax and abdomen clothed with shorter smooth hair, antennae with shorter pectinations, palpi not distinctly projecting. Fringes of wings narrower, almost as short as in *Cossus cossus*, shape of wings also resembling that species. Antenna of ♀ with very short pectinations, the abdomen pointed. The species are also otherwise similar to small species of *Cossus*; only three species known, from the eastern corner of the Mediterranean.

P. henleyi *Rothsch.* (=niloticus *Joann.*, pharaonis *Stgr.*) (55 l). Almost exactly like a *Cossus cossus* in miniature, but lighter grey, the striation of the forewing not so sharp, but merged together to form dark lines often slightly broken as in *C. cossus*, and in exactly the same place (at two-thirds). At the apex of the cell of the forewing a small dark transverse spot in a scarcely lighter patch. Hindwing dirty brownish grey. Our figure is very exact. — From Cairo, rare. Larva in Acacia nilotica. *henleyi.*

P. johannes *Stgr.* (55 l). In the figure of the type (in Iris 12, plate 5 fig. 14) the shape of this *Paropta* is absolutely erroneous. Our figure is quite exact, but among the specimens before us there are some with lighter, nearly pure whitish grey hindwing. Above all, our figure shows much better the broad head and abundant hair on thorax and dorsum of abdomen. Scarcely larger than *henleyi*; the black markings of the forewing, however, more distinct, sharper, more profuse. The fringes not quite so narrow, more distinctly chequered. — Palestine. *johannes.*

P. paradoxus *H.-Schäff.* (55 m). Larger, more clumsy, with broader wings, darker than the preceding species. The forewing not sharply striated, but irregularly chequered. Antenna of ♀ with short pectinations. Hindwing uniformly dirty grey. — Distributed from Asia Minor over Syria to Egypt, but usually rare. Larva in Ficus. *paradoxus.*

7. Genus: **Catopta** *Stgr.* (1899) (= Newelskoia *Gr. Grsh.*, 1899).

Rather robust, with broad head and stout thorax. Palpi small and thin, but distinct. Antennae pectinate to the apex. Tibiae clothed with long hair, abdomen also with long and thick hair. Forewing broad, with very steep distal margin, so that the apex nearly forms a right angle, greyish brown with black striation, pale water marks and white spots. Above, in and below the cell dark patches of erect scales. — Only one species known, discovered in Amurland by Graeser.

C. albonubilus *Graes.* (= albimacula *Stgr.*) (55 l). Larger than most *Hypopta*, dark greyish brown intermixed with silvery grey, and striated with black. At the apex of the cell a large indistinctly bounded cloud white. Below the middle of the cell a black drop-shaped pad of upright scales, which is placed like a button on the wing. Similar chains of erect scales along various black striae. — Widely distributed and apparently not rare, from Issyk-kul and Tianshan through the desert of Gobi and Mongolia to Amurland. *albonubilus.*

8. Genus: **Dyspessa** *Hbn.* (= Endagria *Bdv.*)

This genus consists of 20 to 30 forms, some of them very closely allied, specimens of which are very rarely met with by collectors. Here and there a ♂ comes to the lamp at night, or occasionally when searching for caterpillars with a lantern, one finds a ♀. The life-history of scarcely any species is completely known. The larva of *ulula*, which lives in onions and naturally has a peculiar strong scent, hibernates twice and the moth is on the wing at the beginning of the summer. I have illustrated the genus by 17 figures on plates 52 and 53, but in spite of that it will not always be easy to name the species. A large percentage of *Dyspessa* found in collections is greasy, worn, and altogether in a hopelessly dilapidated state. Only the kindness of distinguished collectors like Messrs. Bartel, Püngeler, Bang-Haas, etc., who placed their collections at my disposal, enabled me to obtain a sufficient number of well- preserved specimens as models for the plates. The same also applies to the following genus, *Stygia*.

The *Dyspessa* have a short, broad head, medium-sized eyes, distinctly porrect palpi, bipectinate antennae, broad thorax with the collar usually projecting laterally and sometimes encircling the neck like a Stuart collar, slender abdomen, which has a woolly apex in the ♂ and ends in the ♀ in a projecting ovipositor. Hind tibia with two pairs of spurs. Forewing small, triangular, pointed, the costa sometimes slightly concave, the fringes broad, anal angle rounded; hindwing oval, usually grey with dark veins. Veins 6 and 7 stalked. The larva elongate-cylindrical, slightly stouter posteriorly, with a smooth head.

ulula. **D. ulula** *Borkh.* (= pantherina *Hbn.*, hepialica *Borkh.*, hepialina *Hbn.*) (52 k). Extremely variable,
„so that not one of the nine specimens I have is like another“ (Ochsenheimer). Greyish brown, the wings
dull ivory yellow intermixed with greyish brown, so that either the one or the other of the two colours predominates.
A considerable number of specimens from Austria, Italy, etc., has a distinctly visible oblique band on
the forewing, before and beyond which there are greyish, not very dark shadows, and dark greyish brown hindwing
lighter in the anal area; I have therefore chosen a similar specimen for the figure. But among these
there are specimens in which the light and dark places form a kind of chess-board, and also examples in which
the dark shadows are strongly reduced. The species is widely distributed, occurring in South-Germany (southward
from about Kreuznach and Darmstadt), then in Austria, Italy, the Balkan Peninsula, S. Russia, Anterior
marmorata. Asia to the Altai. — The larger **marmorata** *Ramb.*, from Southern Spain, which is quite regularly spotted,
infuscata. is now, perhaps correctly, regarded as a distinct species. — **infuscata** *Stgr.*, almost entirely uniformly greyish
brown with sparse white markings, is probably also rightly considered as a separate species;c it is smaller tha
algeriensis. the preceding and occurs from Hungary to the Black Sea. — **algeriensis** *Ramb.* (52 i), scarcely half as large
as *marmorata*, similar in colour to the preceding, light dust-grey with lighter wing-cells, from Mauretania,
is probably also a distinct species. — All these closely allied forms live especially on sandy soil, and are locally
not rare. The larva is rather like a young one of *Cossus cossus*, is flesh-coloured, darker red dorsally, with
brown head and thoracical plate. In the bulbs of Allium; the pupa is said to have been found in a wooden cell
near Darmstadt. Moth in May and June.

aculeata. **D. aculeata** *Turati* (52 i). The figure is a very good reproduction of the cotype which was kindly lent to us. It is closely allied to *ulula*, but the basal area of the forewing is almost without spots, the postmedian oblique band reduced, thorax and abdomen ivory yellow, and the hindwing of ♂ also ivory yellow (instead of earth-brown) with dark veins. — From Sicily.

pallidata. **D. pallidata** *Stgr.* (52 k). The original of our figure, which was lent from the Staudinger-collection by Herr Bang-Haas, has a bright silky gloss, especially in the lighter parts of the forewing. It is not very different from *infuscata Stgr.* and *fuscula Stgr.*, and is considered by Püngeler to be a distinct species especially on account of the shorter pectinations of the ♂-antenna and the non-chequered fringes, and by Rebel to be a form of *ulula*.

kabylaria. **D. kabylaria** *Bang-H.* (52 k). In size and shape very like the preceding, but the pectinations of the antenna very much stronger, even more so than in *ulula*; ground-colour grey, not whitish as in *pallidata*, forewing with dark markings, but the interior of the cell quite white, and a stripe between the costal and subcostal bright silvery white; hindwing grey. — Described from a number of specimens from Gafsa in Tunis; also caught by A. Andres at the lamp in the Mareotis-desert (Egypt).

fuscula. **D. fuscula** *Stgr.* (52 k). Between *pallidata* and *ulula algeriensis* and perhaps not specifically different from *ulula*, as may also be the case with the two previous forms. Darker and still less marked than *pallidata*, more sandy brown, not so grey as *algeriensis*. — From Eastern Algeria.

emilia. **D. emilia** *Stgr.* (52 k). Various forms with very different markings are in the market under this name. The true *emilia* is rather closely allied to typical *ulula*, but the median shadow is more regular, not so dark; the marginal area purer, the hindwing of the ♂ more uniformly brown. — From the Black Sea.

salicicola. **D. salicicola** *Ev.* (52 k). From the same locality as the preceding, which it resembles exactly in shape The forewing is glossy silvery white, only with minute brown spots at the apex of the cell and above the middle of the hind margin, and the basal half of the fringes chequered with brown.

alpherakyi. **D. alpherakyi** *Christ.* Slightly recalling *emilia* in shape and scheme of markings, but larger, forewing of ♂ more elongate, body and forewing ivory white, slightly dusted with brown, with brown discocellular spot, which continues almost to the centre of the hind margin as a greenish brown shadow. The hindwing of ♂ dark greyish brown, with broad whitish fringes. — From Armenia.

bipunctata. **D. bipunctata** *Stgr.* (= colon *Christ.*) (55 l). Very easily recognisable, usually considerably larger than the preceding and than the small specimen figured. Entirely ivory-yellow. The forewing has one black dot above the middle of the hind margin and one or two at the apex of the cell. — Asia Minor, Armenia, Palestine.

lacertula. **D. lacertula** *Stgr.* (52 k). Almost as large as the preceding, but dirty dark greyish brown in colour. In the cell there is nearly always a distinct lighter wedge-shaped spot on a slightly darker ground, and around the cell there is a larger or smaller number of small light spots. Hindwing with lighter base. Fringes of both wings chequered. — From Ferghana and Tianshan. Staudinger obtained this species together with and from the same locality as *agilis*.

agilis. **D. agilis** *Christ.* (55 k). Very closely allied to the preceding, but distinguished by the antenna of the

♀ being pectinated instead of serrate. Altogether lighter, more brownish, discocellular of forewing deep black, fringes not so deeply chequered. From Turkestan. — **magna** *Stgr. i. l.* (52 k) is distinctly larger, with broader wings, more dusty grey. *magna.*

D. bucharana *Bang-H.* (55 k) differs but little from *agilis*, only being somewhat larger, with the markings more prominent. *bucharana.*

D. clathrata *Christ.* (55 k) differs very little from the form *tristis*, but there is an additional small light spot beyond and below the light wedge-shaped cell-patch of the forewing. Also from Turkestan. The fringes of this species are narrower and less distinctly chequered. — **tristis** *Bang-H.* is considerably smaller, and so coloured and marked that it might be called a form of *lacertula*. — The last three forms are Central-Asiatic and partly more abundant than *agilis*. *clathrata.* *tristis.*

D. nigritula *Stgr.* was described from a damaged ♂ from Trans-Alai. 22 mm (the size of a moderate *ulula*). Wings semitransparent, black, forewing with very obsolescent light white markings. At the apex a small spot, below it another, and some white markings extending from the outer and costal margins. Underside lighter, darker towards the margin. Hindwing semitransparent with blackish veins and margin; tips of fringes whitish. *nigritula.*

D. minima *Bang-H. i. l.* (52 k). Herr Bang-Haas has sent me under this name some specimens which are apparently a dwarfed form of the *lacertula-agilis* group. They are at once recognisable by their much reduced size, which scarcely equals that of *ulula algeriensis*. Moreover, the forewing is uniformly dusty grey, the markings, of which the light wedge of the cell and the shadowy spot above the middle of the inter-margin can be distinguished, are obsolescent; hindwing with light basal area. — The locality is given as „Dehibat". *minima.*

D. argaeensis *Rebel*, from Erdchias-Dagh, caught in July. Unknown to me in nature. Very like certain specimens of the variable *ulula-infuscata* ♀, but according to Rebel the antennae are shorter and the abdomen is blackish brown. Also resembles the Algerian *fuscula Stgr.* (52 k), but is distinguished from this by the dark brown abdomen and by the forewing being entirely without markings. *argaeensis.*

D. taurica *Rebel* has been described as a doubtfully distinct species, and is said to be very like *argaeensis*. Wings and abdomen as in the preceding, but the thorax bright brown with 2 light stripes. — From the Bulghar-Dagh. Unknown to me. *taurica.*

D. monticola *Gr.-Grsh.* (52 i). A large species. Forewing, as shown by the figure, bearing white spot on a smoky greyish brown ground at the costa and middle of hind margin, and with a dark halo around the white discocellular spot. Hindwing dark greyish brown, lighter before the hind margin; fringes chequered. The thorax with white hairs in front and behind. — From Ferghana. *monticola.*

D. cossoides *Graes.* (52 i). I figure the type ex coll. Püngeler. Graeser's description was evidently written without reference to the other forms of *Dyspessa* and therefore scarcely mentions the differences. Considering the great variability of the species of *Dyspessa* (cf. figures of *ulula typica* and *algeriensis*, plate 52 k and i) I think the important points are the large size, the uniform dull greyish brown colour, the very intricate markings which are much broken up and show hardly any regular pattern, and the abdomen of the larger ♀, which is remarkably long and has a very long ovipositor. — From Issyk-kul. *cossoides.*

D. asema *Püng.* (52 i). Our figure, taken from the type, is very exact. The species is characterised above all by the dark markings being composed of coarse grains on the whitish ground-colour, which is only visible in small and scattered patches, and giving the forewing of the insect the appearance of being sprinkled with sand. As suggested by the author, the whitish clouds are perhaps the result of the scaling having become worn during flight, being more or less covered over by dark scales in fresh specimens. — From Askhabad and Turkestan. *asema.*

D. jordana *Stgr.* (55 l). This form already stands apart in the genus, in which the Staudinger and Rebel catalogue places it, and like *asema* inclines towards the preceding group. On the whole, *jordana* strongly resembles *asema*. Abdomen and hindwing almost the same in colour but more lightly shaded; forewing more uniformly dull ivory, with the markings as in the figure, which however does not show the peculiar silvery gloss extending over the forewing and the almost white thorax. Syria. — The western form, from Mauretania, is somewhat more strongly shaded, and has sharper markings; this is **suavis** *Stgr.* — A similar form also occurs in Egypt, which was caught at the lamp by A. Andres in the Mareotis desert. *jordana.* *suavis.*

9. Genus: **Stygia** *Latr.*

Mostly small moths with the facies of *Dyspessa* or often much smaller, almost resembling small *Psychidae*. Antennae very variable, sometimes with long pectinations even in the ♀; palpi strong, frons shaggy. Thorax and abdomen with long hair, but the hair usually rubbed off in the very restricted number of specimens found of some species in collections. Abdomen of ♀ long and pointed, tapering into the projecting ovipositor, in the ♂ with sligtht (bu often injured) anal tuft. Hind tibia with two pairs of spurs. Wings entirely or for half their extent semitransparent, or with semitransparent patches; forewing usually with rounded apex, hindwing small. The moths are rarely obtained, and even the largest collections contain series only of *S. australis*, the typical form.

australis. **S. australis** *Led.* (= terebellum *Hbn.*, *leucomelas O.*) (55 k). Thorax and forewing brown, more or less yellowish. Forewing with blackish markings abdomen and hindwing black; the former with brownish yellow dorsal stripe which is transsected by thin, dark, segmental bands; hindwing with semitransparent silvery white rhomboidal discal spot. In Spain and at the Riviera, not common. — *rosina.* The form **rosina** *Stgr.*, from the Spanish province of Murcia, has the forewing dark brown instead of yellowish brown, and the white discal spot of the hindwing is smaller. — Larva in the roots of Echium, flat, ivory-white, with thin bristly hair, head and nuchal plate blackish. The moth at Midsummer, resting in Echium-bushes towards evening, but not sucking, as it has no tongue; very local.

ledereri. **S. ledereri** *Stgr.* (= Dicida persa *Strand*, ? stygiella *Bdv.*) (55 k). Usually smaller than *australis* (although very small specimens of this also occur), and with very characteristic colouring and marking. The wings are very transparent, forewing dusted with yellowish red at the base and costa, margins of hindwing blackish. From the Black Sea, Asia Minor and Persia.

colchica. **S. colchica** *H.-Schäff.* (= amasina *H.-Schäff.*) (55 k). Almost exactly like a small *ledereri*, with which it is doubtless very closely allied, if it is not only a variety of it. Hindwing somewhat lighter and more evenly transparent. Has about the appearance of a Psychid. It is very doubtful whether *colchica* is a distinct species. It was described from single specimens which differed distinctly from one another. — From the South Russian steppes, Black Sea.

dercetis. **S. dercetis** *Gr.-Grsh.* Very like *colchica* (55 k), perhaps only based on a fresher specimen, and therefore the yellow colour at the head, thorax, abdomen, legs and costal and inner margin of forewing more distinct. — From Moabia.

ahngeri. **S. ahngeri** *Gr.-Grsh.* Like *dercetis*, but the antennae with longer pectinations, black; head, thorax and the basal segment of the abdomen above yellowish, with blackish hairs. Forewing semitransparent, sooty grey, occasionally with yellowish scales at the base. — Transcaspia.

aethiops. **S. aethiops** *Stgr.* Very like *colchica* (55 k), but still smaller. Forewing shot with brownish. Distinguished from *colchica* and *tricolor* by the costal vein of the hindwing not being forked in both sexes, while it is forked in the other species. — Discovered at Namangan by Haberhauer; Marghelan.

tricolor. **S. tricolor** *Led.* (55 k). ♂ scarcely larger than *colchica*, and the ♀ also still smaller than that of *ledereri*. The form is intermediate between the two species. Sooty black-brown, lighter in the costal area, more so in ♂ than in ♀. Thorax and base of wings very slightly dusted with orange yellow. — Fairly widely distributed and, apart from *australis*, the form most frequently found in collections. Southern Russia, Asia Minor and Syria.

psychidion. **S. psychidion** *Stgr.* Larger, almost like a small *australis* in expanse, body and wings smoke-grey, or the prothorax clothed with somewhat lighter hair. — From the Taygetus Mts., in Asia Minor, discovered by Krueper; the author says that this insect is perhaps a form of *Dyspessa ulula*, to whose variety *algeriensis* it would come nearest. Unknown to me in nature.

psyche. **S. psyche** *Gr.-Grsh.* Antennae stout and long, and bipectinate in contradistinction to the preceding. Body stout, black, thorax grey, legs black, tibiae yellow on inside; hindwing transparent with a slight milky gloss, only rarely with yellowish scales at the costal or hind margins as in *ledereri* or *tricolor*, but with the veins and fringes yellowish. 7.5 mm. — From the steppes of the Kisil-Kum.

10. Genus: **Zeuzera** *Latr.*

An economically important genus distinguished from most others by the often very conspicuous colouring. Genuine protective colouring, otherwise quite common among the Cossids, is found here only in exceptional cases, and even then only to a slight degree. On the other hand, bright golden or glossy metallic blue markings and spots occur frequently. Many Zeuzerids, e. g. the form *auroguttata* from W. Africa belonging to the genus *Chalcidica*, and *hypophinoë* from Ceram, being among the most beautiful moths. The very bright colours, such as a white ground spotted with steel-blue, are evidently warning colours, for it has been observed that when, for instance, various moths were given to hens, they would not touch *L. pyrina*, while they swallowed the others greedily.

The Zeuzeras are very easily distinguished by the elongate body, which has an almost cylindrical thorax and in the ♀ a very long abdomen, and by the very short antennae, which are very slender, but have long pectinations in the basal part in the ♂. Eyes large; palpi and tongue atrophied; legs strong, long, with sharp claws, especially the fore leg with stout femora and tibiae; wings ordinary in shape the edges of fore-and hind wing, which touch, not particularly ventricose; costal margin of forewing curved forward (ventrally) in a peculiar way to the origin of the subcostal. Most conspicuous characters are the great length of that part of the thorax which extends beyond the base of the forewing forward, and the strongly convex frons. The larva, as far as is known, is very polyphagous, living in all kinds of trees, and does not confine itself to the trunk but also attacks branches and roots. It is slightly flattened, with swollen first thoracical segment and large head with strong mandibles. It takes two years to develop.

pyrina. **Z. pyrina** (aesculi *L.*, hippocastani *Poda*, hilaris *Fourcr.*, octopunctata *Bdv.*, decipiens *Kirby*) (52g). White, tibiae and abdomen, numerous blue spots on the forewing, fewer and smaller ones on the hindwing, six drop-shaped spots on the thorax metallic dark blue. In the ♂, which is sometimes only half the size of the ♀, the abdomen is clothed with white hair. One of the most widely distributed moths of the world, occurring in Europe and North Asia, as far as India, in Africa going far into the Sahara, and in Eastern North America. Egg reddish brown, cylindrical, flattened at the poles. Larva light yellow, with numerous black dots, blackish brown nuchal plate edged with yellow, and black head with yellow markings. In numerous deciduous trees, especially fruit-trees, horse-chestnut and maple. Pupa light brown, a horn-like process on the head. Pupation usually takes place at the beginning of May of the second year in or near the roots. The moth appears in June and July, at Biskra in Algeria sometimes in April or the beginning of May, probably elsewhere also at other times. The moths begin to swarm soon after sunset, and numbers of ♂♂ are often found at lamps as early as 10 o'clock. This is especially the case in North America and Africa, where the species is much more abundant than in Europe. The moths usually dash against the large arc-lamps in concert-gardens, at railway-stations, etc., and then fall down, often lying on their backs with closed wings for some considerable time. The ♀♀ usually fly later and come to the lamp less often. The species is more abundant in some years than in others, often being quite rare in Europe for decades and then occurring in exceptional abundance. The moths vary greatly in the size and number of the spots. In the ♂ the spots before and around the apex of the cell of the forewing are especially variable, often merging together to form blue horseshoe-marks. In specimens from South Algeria the first and second pairs of thoracical spots are mostly so merged together as to form a steel-blue arc.

multistrigata. **Z. multistrigata** *Moore* (52 g). Similar to the dangerous "coffee-borer", *Z. coffeae*, the white borer of the coloniests, and often mistaken for it. Larger than *Z. pyrina*, thorax and abdomen so densely clothed with white hair that the dark markings almost disappear. On the wings the dark dots are usually denser, but the anal part of the hindwing is devoid of them, and in the ♂ projects in lobe-shape. — Common in coffee-plantations, and observed throughout the year. Kashmir, in the Indian Himalayas, distributed as far as Sikkim, and in the Naga Hills.

nubila. **Z. nubila** *Stgr.* (= stryx *Gr.-Grsh.*) (52 g). Usually smaller, duller white than the preceding, thorax with two black streaks diverging posteriorly. In the ♂ the wings are not spotted with blue, but dusted with greyish brown in such a manner as to leave a white spot below the cell of the forewing. — Turkestan (Kashgar).

regia. **Z. regia** *Stgr.* (52 g). Much more clumsily built than the preceding. Almost like a *Cossus* in colour, and like that moth with dark striation. The costa of the forewing broadly dark brown, below it a light longitudinal stripe sparsely and minutely dotted runs from the base into the apex. — From Asia Minor, rare.

ariana. **Z. ariana** *Gr.-Grsh.* This was described from a defective ♀, the species is not before me. Head and thorax ochreous above, brick-red below. Forewing similar, marbled with brown striae and transverse lines above, and with a band of the same colour in the median area. Hindwing paler. — Discovered near Samarkand by Werigin.

11. Genus: **Phragmataecia** *Newm.*

The reed-borers are medium-sized and rather unicolorous moths with very long abdomen, always in the ♀ and sometimes in the ♂, which they are able to move in worm-like curves over the head and wings; on account of the abdomen, the body attains a length greater than the expanse of the wings, this being the case to the same degree in very few Lepidoptera. The colouring is usually uniformly dull yellow, like dry cane, the wings as a rule without markings. The very elongate larvae live in reeds, below or just above the surface of the water, and also pupate there, after gnawing a hole for emerging.

Head small, without palpi and tongue; frons with rough hair, not so strongly convex as in *Zeuzera*. Antennae thin and short, in the ♂ with long, sometimes plumose, pectinations to the middle. Thorax very long; legs short, without spurs. Abdomen very long. Wings elongate, the forewing not increasing much in breadth, ventricose at the hind margin, with the hind-marginal vein forked at the base. The veins of the forewing very straight, with areole and intracellular vein. Hindwing elongate-ovate with distinct anal angle, but with the apical angle effaced.

castaneae. **P. castaneae** *Hbn.* (= arundinis *Hbn.*, innotata *Walk.*, sacharum *Moore*) (54h). Body and forewing light dirty brownish white, wings with slight dark dusting in places, hindwing lighter, in the ♂ very slightly tinged with sand-brown. Throughout the whole of Northern and Central Europe, over Northern Asia through Turkestan and China to Japan; also occurring in many localities of India to Ceylon, and in large districts of Africa to Madagascar, and therefore one of the most widely distributed moths of the world. Larva elongate, ivory, with two dull obsolescent dorsal lines interrupted here and there. Pupa very elongate and mobile, with belts of hooks on the abdomen and a hook-like process on the head. The moth appears in June and rests closely appressed against the reed, so that it can hardly be distinguished except when it settles on a green stalk, as it sometimes does, in which case it is visible from a long distance. When the insect is at rest the abdomen protrudes far from the closely folded wings. In boggy districts, also at rivers, but not everywhere, and absent from large districts. The body of the moth is best emptied before the insect is set, as it otherwise gets greasy very easily. Certainly black pins should be used to avoid the development of verdigris which would ultimately burst the thorax. *minor.* Small specimens, **minor** *Moore* (= pygmaea *Graes.*, minima *Hamps.*), occur especially in Eastern Asia, but also in Europe; these are very pale in colour, almost like *territa*, and without dark specks on the forewing. — Inversely, also more densely dusted and smaller specimens are known from the Ussuri, with dull grey and somewhat narrower forewings. Perhaps the next insect belongs here.

furia. **P. furia** *Gr.-Grsh.* Shape and size of *castaneae*; but forewing dusted with dark ashy grey nearly to the outer margins, so that a narrow edge of the latter is ivory. — From the Pamir.

territa. **P. territa** *Stgr.* (54 h). Like the preceding, but the forewing a clearer ivory or light straw-yellow, not dusted with grey; forewing narrower at the base, hindwing more elongate, with the anal angle effaced. — At the Black Sea and in Turkestan. According to a verbal communication of Herrn M. Bartel also in South Russia near Saratow and at the salt sea of Indersk. A smaller, slenderer, and somewhat lighter form of this insect also occurs, which I caught in June at Shanghai, resting on blades of grass; this is **transcaspica** *Gr.-Grsh.* *transcaspica.*

roborowskii. **P. roborowskii** *Alph.* (52 i). Size and shape as in *territa*, but the forewing darker, more ochreous, although not so much so as in our rather too golden yellow figure. Hindwing white, brownish white at the anal margin. — From the desert of Gobi in Eastern Asia.

reticulata. **P. reticulata** *Püng.* (52 h). We give an exact figure of the type, which Herr Püngeler was good enough to lend me for the purpose. Size, colour and markings are just as in our figure, also the peculiarities of the shape, in which the species differs from other *Phragmataecia*, viz. the developed palpi, the much stouter thorax, the broad forewing recalling *Cossus*, the much larger, not elongate hindwing and the shorter abdomen. The hairs are also more rough, woolly, not so smooth as in other *Phragmataecia*. The head is more hidden beneath the much shorter prothorax. In the hindwing the submedian and the hind-marginal veins are more strongly curved. From Merv. — This insect unites generic characters of the most different *Cossid*-genera, and should be separated as a distinct genus, if it does not belong to the Indian genus of *Argyrophleps Hamps.*

Alphabetical List

of the Palearctic forms of *Cossidae* with a reference to the original descriptions.

* signifies that the form is figured at the place quoted.

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aculeata Dysp. *Turati*, Natural. Sicil. 1909, p. 121. *
aethiops Styg. *Stgr.* Stett. Zg. 1887, p. 91.
agilis Dysp. *Christ.* Rom. Mém. Lép. 1, p. 113. *
ahngeri Styg. *Gr.-Grsh.* Ann. Mus. Pét. VII, p. 203.
albida Holc. *Seitz*, Macrolep. 2, p. 421. *
albonubilus Cat. *Graes.* Berl. Ent. Zeitschr. 1888, p. 119.
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alpherakyi Dysp. *Stgr.* Rom. Mém. Lép. 2, p. 3. *
araraticus Coss. *Teich*, Stett. Zg. 1896, p. 28.
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argaeensis Dysp. *Rebel*, Ann. Wien. Hofmus. 20, p. 205.
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aries Coss. *Püng.* Iris 15, p. 145. *
asema Dysp. *Püng.* Iris 12, p. 288. *
australis Styg. *Latr.* Nouv. Dict. d'Hist. Nat. 21, p. 262.

balcanicus Coss. *Led.* Wien. Ent. Mon. 7, p. 22. *
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bucharana Dysp. *Bang-H.* Iris 24, p. 51.

caestrum Hyp. *Hbn.* Smlg. Eur. Schmett. Bomb. *
campicola Holc. *Ev.* Bull. Mosc. 1854 (III), p. 181.
castaneae Phr. *Hbn.* Beytr. Schmett. 2. *
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clathrata Dysp. *Christ.* Rom. Mém. Lép. 1, p. 114. *
colchica Styg. *H.-Schäff.* Eur. Schmett. II. *
colossus Coss. *Stgr.* Stett. Zg. 48, p. 86.
consobrinus Holc. *Püng.* Soc. Entom. 13, p. 57.
cossoides Dysp. *Graes.* Berl. Ent. Zeitschr. 1892, p. 300.
cossus Coss. *L.* Syst. Nat. 1, p. 504.

dercetis Styg. *Gr.-Grsh.* Ann. Mus. Pétersb. 1, p. 169.
deserta Hyp. *Fisch.-Wald.* Nouv. Mém. Mosc. 1832, p. 358. *
drangianicus Holc. *Gr.-Grsh.* Ann. Mus. Petersb. 1902, p. 201.

emilia Dysp. *Ev.* Hor. Ent. Ross. 14, p. 317.

faroulti Holc. *Oberth.* Ét. Lép. Comp. V. *
fereidun Coss. *Gr.-Grsh.* Hor. Ent. Ross. 29, p. 291.
funkei Coss. *Röb.* Entom. Nachr. 22, p. 3.
furia Phr. *Gr.-Grsh.* Rom. Mém. Lép. 4, p. 542. *
fuscula Dysp. *Stgr.* Iris 5, p. 283. *

gloriosus Holc. *Ersch.* Fedtsch. Reise Turk. Lep. p. 35. *
gracilis Holc. *Christ.* Rom. Mém. Lép. 3, p. 59. *

henleyi Par. *Roths.* Nov. Zool. 1905, p. 23. *
herzi Hyp. *Alph.* Iris 6, p. 346.
holosericeus Holc. *Stgr.* Rom. Mém. Lép. I, p. 149. *
hyrcanus Coss. *Christ.* Hor. Ent. Ross. 22, p. 309.

infuscata Dysp. *Stgr.* Iris 5, p. 284.
inspersus Holc. *Christ.* Stett. Ent. Zg. 1887, p. 163.
insularis Holc. *Stgr.* Rom. Mém. Lép. 6, p. 292.

johannes Par. *Stgr.* Iris 12, p. 354. *
jordana Dysp. *Stgr.* Iris 10, p. 272. *

kabylaria Dysp. *Bang-H.* Iris 19, p. 143.

lacertula Dysp. *Stgr.* Stett. Zg. 1887, p. 92.
laudabilis Holc. *Stgr.* Iris 12, p. 159.
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lucifer Holc. *Gr.-Grsh.* Hor. Ent. Ross. 25, p. 463.

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mauretanica Coss. *Luc.* Bull. Soc. Ent. Fr. 1907, p. 343.
minima Dysp. *Seitz,* Macrolep. 2, p. 427. *
minor Phr. *Moore,* Lep. Atkins., p. 87.
modestus Coss. *Stgr.* Stett. Zg. 1887, p. 88.
mollis Holc. *Christ.* Rom. Mém. Lép. 3, p. 58.
mongolicus Coss. *Ersch.* Hor. Ent. Ross. 17, p. 33. *
monticola Dysp. *Gr.-Grsh.* Rom. Mém. Lép. 4, p. 544. *
mucosus Holc. *Christ.* Rom. Mém. Lép. 1, p. 111. *
multistrigata Zeuz. *Moore,* Proc. Zool. Soc. Lond. 1881, p. 327.
mus Holc. *Gr.-Grsh.* Ann. Mus. Petersb. 1902, p. 198.

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nobilis Holc. *Alph.* Rom. Mém. Lép. 1, p. 139. *
nubila Zeuz. *Stgr.* Iris 8, p. 341.

pallidata Dysp. *Stgr.* Iris 5, p. 284.
paradoxus Par. *H.-Schäff.* Schmett. Eur. 6, p. 39.
powelli Holc. *Oberth.* Ét. Lép. Comp. V. *
praeclarus Holc. *Püng.* Soc. Ent. 13, p. 58.
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pyrina Zeuz. *L.* Faun. Suec. p. 306.

regia Zeuz. *Stgr.* Iris 4, p. 253. *
reticulata Phr. *Püng.* Iris 13, p. 115. *
reibelli Hyp. *Oberth.* Ét. d'Ent. 1, p. 40. *
roborowskii Phr. *Alph.* Rom. Mém. Lép. 9, p. 235. *
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tancrei Holc. *Püng.* Soc. Entom. 13, p. 58.
tapinus Coss. *Püng.* Soc. Entomol. 13, p. 57.
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26. Family: **Hepialidae.**

The Hepialids are a subdivision of the Micropterygina, which represent the oldest type of Lepidoptera now existing. Together with the *Micropterygidae* they form the group "Jugatae" which Comstock (Ithaca, U. S. A.) places in contradistinction to the "Frenatae". This type is distinguished from all other families of Lepidoptera, the Frenatae, which possess a frenulum, by the lobe (jugum) which extends from the base of the forewing to the costa of the hindwing over the gap between the two wings so characteristic of the Hepialids. In the "Jugatae" which is the oldest still existing group of Lepidoptera the phylogenetic derivation of the Lepidoptera from the Trichoptera (Phryganids, caddis-flies) is distinctly recognisable, for not only is their body hairy, but there are hairs on the membrane of the wing, which is never the case in the Frenatae. Moreover, it has been shown by Quail's publications with their interesting illustrations that the structure of the wing-scales of the *Hepialidae* is absolutely unique in that it illustrates the modification of hairs into scales. The venation presents further points for comparison. The oldest of all forms of Micropterygidae, *Palaemicra calcophanes* from New Zealand, equal in antiquity to the Moa, Kiwi and other forms of life of that country, is in its structure so closely allied to the genus *Rhyacophila* of the Trichoptera that it might almost be considered a link between the two orders of insects. The following characteristics especially betray the great age of the Hepialid type, which according to Packard goes back to the Jurassic Epoch. The most striking distinctions of the well-known unmistakable imago, apart from the remarkably long abdomen, the long narrow and rounded wings and the "gap" already mentioned, are the antennae which usually are very short and scarcely visible, and the reduced or obsolete mouth-parts, in contradistinction to which the shaggy legs are strongly developed. The long slender larvae have 16 legs and are naked, with a glossy head and hairy warts, living underground on roots or inside trees. The pupae also present a primitive type: they are elongate, mobile, with free limbs, spines on the abdominal segments (the pupa is the more rigid and has the less number of mobile joints the higher the species stands in the phylogenetic development of the Lepidoptera).

In the habits of the imagines there is also much that is peculiar to this family. The Hepialids are on the wing at dusk, the flight of the ♂ being often of that well-known pendulating kind which can be observed in many other orders of insects, e. g. the Ephemerids. The ♀♀ go in search of the ♂♂, and then fly along over the grass to drop their eggs. Apart from the short time of activity at dusk, scarcely lasting half an hour, the Hepialids are extremely lazy and cannot be induced to fly by any means. Many species also come to the lamp. The distribution of the Hepialids is very general, extending as far as the Arctic regions and up to the snow-line of the mountains. They prefer mountains to plains, and damp localities to dry ones. In Europe the most interesting forms of Hepialids are found in the British Isles. It seems as though the known species, of which there are scarcely more than 200, are the remains of a former magnificent Hepialid or Micropterygid fauna, which, together with the bizarre dragons among the Saurians and relatively just as gigantic, inhabited the mist-laden moors and gloomy fern-woods of a prehistoric epoch. *Zelotypia stacii*, an imposing species (expanse up to 24 cm) and the South American *Phassus giganteus* look like relics from former times. According to Meyrick the centre of distribution of the family is to be found in the Indo-Australian region, especially New Guinea. Who knows whether we may not one day be surprised by a new gigantic form of Hepialidae from the unknown interior of this island, whence we have already received the largest known forms of Ornithoptera and Saturniidae.

From the Palearctic, and especially the European, Hepialids we only get a slight idea of the size and beauty of this highly interesting family. The number of species is small. In Europe proper there are nine or ten forms, while the same number of species occurs alone in New Zealand and three or four times as many in Australia. The latter continent probably contains more Hepialids than the entire Palearctic Region even with its new extended boundaries.

The following Hepialid genera occur in the Palearctic Region: *Hepialus F.*, *Palpifer Hamps.*, *Hepialiscus Hamps.*, *Gorgopis Hbn.*, *Phassus Walk.*

1. Genus: **Hepialus** *F.*

Head and thorax clothed with woolly hair. Antennae shorter than thorax; eyes naked, no ocelli; palpi minute; no tongue, but two round knobs instead. Both wings with 12 veins and a cellule in cell between veins 4 and 5. The fact that the hindwing also has two or three branches originating from the anterior median vein and running into the costal margin is characteristic. Legs short and shaggy, without spurs. Wings elongate-ovate, with obtusely rounded hind angle. The markings of the forewing, the well-known Hepialid triangle, usually consist of two stripes or rows of spots meeting at right angles in the centre of the hind margin. Larva underground at roots, pupates in a cocoon. Pupa elongate, with spines. The moths fly at dusk and when at rest fold their wings in steep roof-shape pressed close to the body. They are predominantly mountain-insects. The Palearctic forms are small to medium-sized; the Australian species, which are united under the generic term *Charagia*, are among the largest Hepialids, their magnificent colouring being unique. The ♂♂ with their green-blue iridescence and the green and red ♀♀ with their silver-spots compare favourably with the most beautiful species of Lepidoptera.

humuli. **H. humuli** *L.* (54 b, c). ♂ silvery white, ♀ forewing yellow, more or less marked with red. Hindwing grey edged with reddish. Underside grey in both sexes. Like all Hepialids very variable in size and colouring, especially the ♀♀. There are innumerable transition from ♀♀ entirely without markings to those in which not only the forewing is more red than yellow but the hindwing also is suffused with red over more than half its area. In the form *hethlandicus* (cf. below) the markings of the ♀♀ are obsolescent brown instead of red. A particularly large form occurs locally in the Alps (*grandis* nom. nov., near Zermatt). Caradja describes a very *azuga.* beautiful form from Roumania, **azuga** (54 c): ♀ very large (up to 73 mm). Forewing brighter yellow, with in- *hethlandicus.* creased brick-red markings, hindwing and underside much darker. — **hethlandicus** *Stgr.* (= thulensis *Crotch*) (54 c), from the Shetlands, is often considered the phylogenetic type, because the ♂♂ have the same markings as the ♀♀, being only smaller and paler. Among some specimens on plate 54 the typical ♂ of *hethlandicus* (fig. 2 row c) is erroneously marked ♀, while a Scotch specimen (fig. 1) is reproduced as a ♂ of *hethlandicus*. *grandis.* — On luxuriant meadows in the Higher Alps the unusually large form occurs which we call **grandis** *form. nov.* (54 b, c). — Transitions from *humuli* to *hethlandicus* (54 c as *hethlandicus* ♂) are common in Northern Scotland. — The distribution-area of the species comprises North and Central Europe with the exception of the Arctic region, the Southern boundary being formed by the Alps and Carpathians. Caucasus, Armenia, Siberia. The species is found particularly on Alpine meadows, where it is abundant in June and July; more singly in the plains. On the wing after sunset and again before sunrise. The peculiar pendulating flight of the glossy white ♂ strikes even the general public, and has caused the name ghost-moth to be given to the insect in England, where *humuli* is common. Some interesting observations about the habits of the moth have lately been published by Schneider (Posen). The moths, which emerge after 5 o'clock, fly in the evening for about 20 minutes until 9 o'clock at the latest; the ♂ usually pendulating a yard above the ground, the fertilized ♀ higher, they copulate often very quickly after circling round each other. Like *hecta*, *humuli* has a peculiar scent; fresh specimens smell like wild carrot. Larva up to 38 mm in length, light yellow with brown head and pronotal plate, sharply defined segments, when young a transparent brown; legs whitish. At the roots of grass, sorrel, hops, where they are sometimes noxious. Pupa elongate, of uniform width, a protuberance at the head, small leg and wing-cases, abdominal segments with distinct tubercles and small teeth in pairs ventrally; nut-brown, in a loose cocoon. Egg first yellowish white, then greyish blue to blue-black; in clusters of as many as 300.

nebulosus. **H. nebulosus** *Alph.* (= luteus *Gr.-Grsh.*, varians *Stgr.*) (52 g). As Staudinger's name indicates an extremely variable species. Forewing dirty grey-brown with greyish white markings, hindwing blackish grey *armoricanus.* with greyish yellow fringes checkered with a dark colour. Western China (Amdo). — **armoricanus** *Oberth.* caught by Oberthür at Rennes (hence the name *armorica*, the old name for Britanny) is similar to *nebulosus*. As the species has not otherwise been observed in Europe it is perhaps only a case of a pupa being introduced accidentally from Tibet. *davidi Pouj.*, from Mupin, is a closely allied species. Very similar to *nebulosus* is also the next species:

variabilis. **H. variabilis** *Brem.* (54 h), from Amurland, is distinguished from *nebulosus* by a shorter basal stripe ending in a whitish spot, behind which there is sometimes a dark dot. The band with its vestigial light colour does not quite reach the outer margin, before it rather far away a darker transverse line. — We add as the last of the *nebulosus* group:

varius. **H. varius** *Stgr.* This species has often been treated as a synonym of the preceding species, but it is probably distinct, as it occurs in the same localities as *variabilis* (Ussuri, Askold). Markings brighter, contrasting crudely, a long white halfband before the outer margin, in the ♀ more extended but duller. According to its facies this species forms a transition to the following *velleda*-group, to which belong *fusconebulosa* with its varieties, *carna* with *uralensis*, *pyrenaicus* with *alticola*, and *castillanus*.

fusconebulosa. **H. fusconebulosa** *Degeer* (= velleda *Hbn.*, mappa *Dom.*) (54 d). One of the most variable species, usually brown in various shades, with greyish white markings, these being sometimes so extended that the whole specimen appears grey, and sometimes quite obsolete. Very beautiful reddish brown to rust-coloured specimens come from Ireland (Belfast), but I have also received similar ones from Upper Bavaria and Westphalia (Bochum), while the specimens from Western Scotland and the Islands (Arran) are remarkable for their *gallicus.* size and the sharpness of their markings. The uniformly brown specimens without markings are named **gallicus** *Led.* (54 d). This was probably originally the form of the oceanic climate and is most beautifully developed *aemilianus.* *ascoldensis*

in Ireland and Western France, but is also widely distributed elsewhere as an aberration (Alps, Lapland; a Hepialid from the Caucasus measuring 70 mm, from the collection of the Grand Duke Nicholas, which was unfortunately lost, was said to belong here). — A new local variety closely alied to *gallicus* is **aemilianus** *Constantini*, from Upper Italy (Montegibbio, Fiumalbo, Prov. Modena), where it flies in September. It is distinguished from *gallicus* by the uniform and more yellow colouring and the uncheckered fringes. — **ascoldensis** *Stgr.*, from the Ussuri district and Askold, is smaller, darker, with the half obsolescent markings only distinctly visible at the inner margin. — Widely distributed through the Northern districts of the area as far as the Pyrenees and Piedmontese Alps in the South. The moths are generally found in the mountains already in June, but a specimen was caught in September at Sheffield. Unlike *humuli*, *hecta* and other species, *fusconebulosa* is a very shy species with a rapid flight, found at the edges of woods and on meadows. Larva long, rather stout, with strongly developed mouth-parts; head reddish brown to dark red, body creamy white or pale green, pronotal plate yellowish brown, spots of the same colour on the anterior segments. A dark dorsal line shining through. When young, more grey in colour. Lives underground in the rhizome of Pteris aquilina, making a cavity for itself in the interior of the plant. Biennial, twice hibernating in the ground as larva, and in May making a thin cocoon. The pupa is slender, stumpy posteriorly, reddish brown, sharply incised, with rows of small hooks and a projection on segment 12; the moth emerges in about four weeks. The pupa bursts the cocoon before emergence, and forces a way out.

carna. *uralensis.*

H. carna *Esp.* (= jodussa *Hbn.*, socordis *Frr.*, uredo *Frr.*) (54 e). Closely allied to the preceding species, but probably distinct. Grey with lighter and usually sharper markings, often transparent. Inhabits the mountains of Central Europe (Alps, Carpathians) and in Hungary also the plains. — **uralensis** *Gr.-Grsh.* is probably a form of *carna*; local varieties of this are distributed throughout Siberia as far as the Arctic zone (Verchojansk). In this form the antennae are chestnut-brown; thorax greyish brown; abdomen and legs brown. Forewing above brown, with irregular white spots, like a *carna* with obsolescent markings; hindwing brown. Ural Mts. between 61⁰ and 64⁰. Vilui River (Maack), Olenek (Czekanovski), Irkutsk (Iltshirski-Saram, 1900 m).

pyrenaicus. *alticola.* *castillanus.*

H. pyrenaicus *Donz.* (54 e). ♂ greyish brown with ochreous and light markings, hindwing with prominently white fringes. The ♀ of this species and of its local varieties are distinguished by aborted wings and greatly enlarged abdomen, especially in the dark var. **alticola** *Oberth.* (54 e, f). Eastern Pyrenees, var. *alticola* on the highest peaks. Rare, found beneath stones. — var. **castillanus** *Oberth.* (54 f) was discovered in the Sierra de Guadarrama. Only the ♂ known, smaller than *pyrenaicus*, lighter, forewing with whitish markings, hindwing brown; underside uniformly brown, fringes checkered. Caught in June 1880 near La Granja in Old Castile.

sylvinus. *pallidus.* *laetus.*

H. sylvinus *L.* (= hamma *Hbn.*, flina *Esp.*, crux *F.*, fauna *Schr.*) (54 g). A new group begins with this well-known species, to which group beside the subspecies of *sylvinus*, belong *amasinus* and probably *nubifer* (subgenus *Cibyra Walk.*). The facies of *sylvinus* with the typical scheme of markings of the Hepialids may be assumed to be generally known. The colour of the ♂ varies from loam-yellow to vermilion and chestnut-brown, that of the ♀ from ashy grey to reddish brown in all shades. Caradja mentions a wonderful dark chocolate aberration from the Transsylvanian Alps. The size also varies considerably. I have a pair from Sprottau, the ♂ measuring 23 mm in expanse, ♀ 47. The size and colouring depend largely on the climatic conditions, the smallest and palest specimens occurring especially in the South (ab. **pallidus** *Horm.*, in Bukovina and Roumania, Caradja). — Of *laetus Stgr.* two forms should be distinguished: true **laetus** *Stgr.* is the largest known form of *sylvinus*, with intense colouring and sharp markings; it occurs in Southern Russia; the other form, smaller, paler, but also sharply marked, occurs in the adjoining Asiatic districts (Uralsk, Caucasus, Armenia, Turkestan). — Widely distributed through North and Central Europe to Dalmatia and Central Asia. The moths appear in August and September and fly at sunset, zigzagging over damp meadows. Emerging towards evening they settle until sunset on trees in avenues, where they are always easily collected. Larva ivory white with deeply incised segments and folds. Head and dorsal plate orange-brown, mouth-parts black, stigmata brown. When young light flesh-colour with dark dorsal line shining through. Lives in the roots of sorrel, bracken, Echium, etc., which it hollows out to a considerable extent, so that the plant withers. Each larva lives in a separate plant; the tunnel is spiral, the opening closed up. Pupa glossy brown, spun up in a tunnel like the larva; leaves the cocoon before emerging.

amasinus.

H. amasinus *H.-Schäff.* (54 e). Is distinguished from *sylvinus* especially by the course of the three bands of the forewing, which are on the whole parallel, and the broad checkered fringes. — Asia Minor (Pontus) and Southern Europe to Istria (Pola), where it occurs in September. Local and rare.

nubifer.

H. nubifer *Led.* (53 h). ♂ similar to *sylvinus* in body, legs, antenna and shape of wings, most like the grey form; distinguished from *sylvinus* by the shape of the median area, which is more as in *carna*. Forewing dull grey, with wood-brown spots and bands edged with dull yellow. Four small spots at the costal margin, another small one touches the second obliquely, a wedge-shaped one stands rather close to the base and touches the hind margin; a broader irregular band runs below the fourth spot, a narrower slightly curved one near the margin. Fringes yellowish brown checkered with dull grey. Hindwing brownish grey with slight indications of two lighter bands in the outer third of the costal margin; fringes uniformly yellowish brown. Underside uniformly grey-brown, only the anterior edges of the wings with indications of the markings of the upper side. Compared with the ♂ the ♀ is enormously large (almost as large as *humuli*), but my specimen is so worn that no description can be made from it (after Lederer). Size of ♂ 38 mm. — Patria: Altai.

ganna. **H. ganna** *Hbn.* (= arcticus *Bdv.*) (54 f). Like its relatives (*macilentus Ev.*, *hyperboreus Möschl.*, *labradoriensis Pack.*, *matthewi*, *mcglachanii*, etc.) this species is a link of a circumpolar chain inhabiting the Northern countries of Europe, Asia, North America (subgenus *Phymatopus Wallgr.*). They all have the forewing more or less reddish brown, rather like that of the *Arctiidae* on account of the glossy white bands and macular markings. In *ganna* the brown colour is darkest, more yellowish brown, the spots are often isolated, the hindwing reddish black-brown. — *ganna* inhabits Northern Europe (Sweden, Russia) to East Prussia, and Eastern Siberia; also the mountains of Central Europe (Alps) from 2500 m upwards. The moths are on the wing in July and August at dawn. In day-time hidden beneath stones.

macilentus. *gerda.* **H. macilentus** *Ev.* (54 f). Very closely allied to the preceding species, but larger, lighter (reddish brown), the silvery white markings more extended, on the hindwing the marginal area considerably broader and suffused with red. Eastern Siberia, Mongolia (Urga). The aberration **gerda** *Stgr.*, from Dauria (Apple Mts.), is so to speak the *gallicus* form of *macilentus*, as its spots are more or less obsolescent, while the ground-colour is more ochreous brown, *gerda* thus forming a transition to *ganna*.

lupulinus. *dacicus.* *senex.* **H. lupulinus** *L.* (54 g). Forewing dark yellowish brown (♂) to grey brown (♀), with white triangle; hindwing brown. — **dacicus** *Carad.* is the local form from Northern Roumania (Comanesti, Grumacesti). It is uniformly dark grey, more or less without markings. It occurs aberratively also outside Roumania, e. g. in Dalmatia, Caucasus and even England. Much more frequent is the inverse aberration (ab. **senex** i. l.) in the British Isles; here the whitish grey or chalky white markings of the upper side are so extended and diffuse that they occupy the entire surface of the wing with the exception of the margins. — Widely distributed but local, England, Germany, Sweden, Livonia, Italy, Dalmatia, Roumania. Appears in May and June; sometimes a second brood in September. As regards the habits, we know that the ♂♂ fly before sunset for a very short time, but very wildly; but Caradja also saw them swarm by day (11 a. m.) looking for the ♀♀, which rest on the underside of leaves. Larva stout, whitish, semitransparent, head and nuchal plate glossy brown; stigmata black, the raised spots yellowish brown, each with a short black bristle. Polyphagous on roots in fields, meadows, and gardens (in England as far as the surburbs of London, not rare). The larva is sometimes infested by a parasitic fungus (Cordyceps entomorrhiza Deits); this is also the case among other Hepialid larvae, for instance in New Zealand, where the fungus grows very long, its tip appearing above the ground. Pupa cylindrical, uniformly stout, with short projecting antennae-cases and short wing-cases, very mobile, five abdominal segments bearing spines; glossy reddish brown or ochreous brown. In a long narrow cocoon in the ground. Before emerging the pupa leaves the cocoon and comes to the surface.

hecta. *flina.* **H. hecta** *L.* (= jodutta *Esp.*, nemorosa *Esp.*) (54 g). ♂ light brick-red to dark chestnut, with silver or sometimes golden stripes; in rare cases in Northern English and Scotch specimens rows of golden dots at the apex of the hindwing, pale brown, with lighter markings. The darkest forms are called ab. **flina** *H.-Schäff.* (54 h). Northern Europe and Siberia to Japan. The commonest Hepialid, usually found on heaths. The moth appears at the end of June; the ♂♂ look like large red flies pendulating over the bracken in the last rays of the setting sun; the ♀♀ usually rest on the underside of leaves. Freshly caught ♂♂ emit a curious odour, like fir-cones; it is at once noticeable on opening the collecting box containing a few specimens. The scent-organ is situated in the tibiae of the hind leg; it consists of glandular cells in consequence of which the tibia is swollen in club-shape. Larva slender, cylindrical, more pointed at the head and tail, body very regularly jointed, each segment being divided into four rings. Pale brown, head darker, segments 2 to 4 somewhat transparent, on each ring two black spots clothed with hair. Stigmata black. Changes but slightly. Extraordinarily averse to light; when the hairs are touched very sensitive and wild. In the autumn, preferably in the roots of Pteris aquilina. Pupa slender, uniformly stout, head and thorax slightly outlined, abdominal segments with rows of small hooks. Dark brown, the silver spots shining through the short wing-cases. In a loose cocoon covered with earth, which the pupa leaves before the moth emerges.

mlocossewitschi. **H. mlocossewitschi** *Rom.* (54 h). Forewing ochreous, a slightly curved stripe at the base, a triangular median spot, a branched band before the outer margin, a small apical spot and a marginal stripe brown, hindwing brownish yellow. — In South-Western Caucasus, found near the estate of the Grand Duke Nicholas Michailovitch by the forester Mlocossevitch and named after him.

2. Genus: **Palpifer** *Hamps.*

As already indicated by the name, distinguished by the relatively strongly developed palpi. Antennae shorter than the very hairy thorax. Wings narrower, the hind angle of the forewing more produced, not so obliquely and evenly rounded as in *Hepialus.* A small North Indian genus, one species of which reaches the Palearctic Region.

P. sexnotatus *Moore* (= murinus *Moore*, taprobanus *Moore*) (54 e). Forewing black, lighter in the hindmarginal half; six yellowish dots. Hindwing black with yellow basal area, fringes yellow in the median portion of the outer margin. Found in Kashmir and near Darjiling. Several other species inhabit Assam (Khasia Hills), among them the smallest known Hepialid (*P. minutus*). — We give the name **ronin** *form. nov.* (53 h) to a Japanese form which is at once distinguished from *sexnotatus* by the hindwing being uniformly brown, not orange-yellow (ronin = restless person). *sexnotatus.* *ronin.*

3. Genus: **Hepialiscus** *Hamps.*

Palpi absent. Antennae short, filiform. Forewing with veins 1 a and 1 c short and slender; a cross-vein between 1 b and 1 c and the median vein; both wings with veins 8, 9 and 10 stalked, and two small veins in the cell, which are curved downwards, touching the centre of the median vein. Legs short, hairy, tibiae without spurs. Distinguished from *Hepialus* by vein 8 in the latter genus originating in both wings from the cell. Larvae in roots of grass, etc.

H. nepalensis *Walk.* (= indica *Walk.*, pauperatus *Walk.*, marcidus *Walk.*) (54 d). Head, thorax and abdomen greyish or reddish brown. Forewing greyish or ochreous brown, with four indistinct series of small dark specks or small ring-spots on indistinct pale oblique bands; a submarginal series of specks or ring-spots on pale spots. Hindwing pale fuscous. In the form *indicus* (= *marcidus*) black blotches are developed in, beyond and below the cell of the forewing. Expanse ♂ 44, ♀ 56 mm. — Simla; Kulu; Nepal; Sikkim (HAMPSON). *nepalensis.*

H. algeriensis *Joann.* (53 h). Expanse 26 mm. Forewing greyish brown, with 9 black and rather irregular transverse lines, irregularly bordered with white scales from the costal to the hind margin (lines 2 to 7) and outer margin (lines 8 and 9), especially at the end of lines 2, 3 and 4 at the costa and line 6 at the hind margin. Outer margin with six white dots between the afore-mentioned lines and dots bordered by a few yellow scales. Hindwing greyish brown with white marginal dots between the veins. Head reddish, thorax and abdomen above greyish brown, below yellowish. Antennae strongly ribbed. — St. Charles near Philippeville, Algeria (according to DE JOANNIS). Probably distributed over the greater part of North Africa. As Abbé DE JOANNIS once told me, the species is variable. He mentions reddish and yellowish specimens. On Plate 52 h one of these forms is figured in which there is some ivory colour along the costal margin of the forewing and transversely over the abdomen; this is ab. **bicolor** *ab. nov.*, from the mountainous interior of Tunisia. Similar is ab. **joannisi** *Luc.* *algeriensis.* *bicolor.* *joannisi.*

4. Genus: **Gorgopis** *Hbn.*

Antennae longer than the thorax; strongly pectinate in the ♂, by which *Gorgopis* is at once distinguished from all other Palearctic Hepialid genera. Forewing evenly rounded at the hind angle, both wings with broad fringes. Body shaggy. The species of *Gorgopis* are usually insignificant, and inhabit especially South and East Africa. Only one species occurs on Palearctic territory.

G. niphonica *Butl.* "Primaries above olive-brown, shot with rose-colour towards the outer margin; the subbasal area darkest, marked with two unequal white dots placed obliquely; a spot closing the cell, an irregular discal series doubled above the median vein and a marginal series deep olivaceous; secondaries greyish brown, shot with rose-colour; thorax olivaceous; abdomen greyish brown; under surface bronzy olivaceous, tinted with rose-colour. Expanse of wings 34 mm." — Japan. *niphonica.*

5. Genus: **Phassus** *Walk.*

An exceedingly well characterized genus, distinguishable at the first glance from all other Hepialid genera. Antennae very short and slender, palpi scarcely visible, tongue absent. Abdomen very long. Wings broad, forewing of ♂ produced in sickle-shape into a sharp point, with golden or silver stigmata. Of medium size or larger, exotic species up to gigantic size. The facies of *Phassus*, marbled with brown and grey in many shades, recalls more than that of other Hepialids the descent of the family from the Phryganids. Its numerous species inhabit tropical America and Asia, and extend into the Palearctic Region. The larva live in tree-trunks, the spines of the pupa are strongest in the region of the abdominal legs.

signifer. **P. signifer** *Walk.* (= chalybeatus *Moore*, sinensis *Moore*, undulifer *Walk.*) (54 a). ♂: Head, thorax and abdomen, as well as the ground-colour of the forewing yellowish, flesh-coloured or light greyish brown, median area nut-brown to olive-brown, with silvery stigmata proximally and distally. This triangle and the discal stripe merged together with it bear a number of indistinct ring-spots at vein 2 in the posterior area. Hindwing usually reddish brown or flesh-coloured. ♀ darker, forewing with larger costal spots. Hindwing shot with yellowish brown and with a dark spot at the apex. In a specimens from Burma the ground-colour of the forewing is pale brownish yellow, without the light spots in the cell, and the hindwing ochreous brown. ♂ 100, ♀ 154 mm, very variable in size and colour. — *signifer* is widely distributed, East India, Sunda *herzi.* Islands, China; near Shanghai it enters Palearctic territory. The smaller, darker **herzi** *Fixs.* (54 a) with *sinensis.* dull markings, from Corea, often bears two small silver dots at the apex. **sinensis** *Moore*, from Central China, might also be considered a variety; dull brown, the inner stigma of forewing obsolescent, hindwing reddish brown.

excrescens. **P. excrescens** *Butl.* (= aemulus *Butl.*). ♂: Forewing above pale pink brown, reticulated with grey and sparsely irrorated with black, margin with black spots, basal half with the exception of the costal and hind areas occupied by a large triangular yellowish brown spot, the lower edge of which is bordered with white; an indistinct yellowish brown discal band; hindwing grey, with brown costal and outer margins, a black subapical costal spot. Body brown. Underside glossy brown; costa of forewing dirty white with blackish spots. ♀ larger, more deeply coloured. Expanse 60 to 90 mm. — Japan; also in the Amur district.

camphorae. **P. camphorae** *Sasake* is a closely allied species from Japan.*) Larva lives in Cinnamomum camphorae.

shamyl. **P. shamyl** *Christ.* (54 a). Both wings produced into points, being especially sharp in the ♂. Forewing dark brown to ochreous, markings flesh-coloured, the silver stigmata sometimes more golden. Hindwing greyish brown, more or less broadly suffused with red in the apical portion and at the margin. Underside brownish, both wings edged with red. Size very variable, my smallest ♂ measures 53, my largest ♀ 88 mm. — In the Western Caucasus, not rare, but local, e. g. at Maicop, Kuban district. Life-history and habits very like those of *H. hecta.* Very interesting and important observations on this point have been published by Messrs. DEEGENER and CHATSCHATUR SCHAPOSCHNIKOW. *P. shamyl* also possesses a scent-organ to attract the ♀. The so-called scent-area is situated at the posterior surface of the tibia of the hind leg and is densely clothed with scent-scales, which attain to 5 or 6 mm in length. They contain a cavity into which flows the secretion of the scent-glands situated in the tibia. We may assume that the ♀♀ are sexually excited by the scent. The moths are on the wing immediately after sunset at the edges of woods. First the ♂♂ appear, flying at most for a quarter of an hour (pendulating), then the ♀♀, which fly somewhat longer and more steadily. ♂♂ and ♀♀ fly together for a short time, then the ♀ settles, copulation follows, and the ♂ then falls backward. When it hangs thus on the ♀ the two together resemble a rolled-up dry leaf. The fertilized ♀ lays up to 2000 eggs. The ♂♂ are very excited sexually, often three of four precipitate themselves on to one ♀. This is also the case in *hecta*; I once found five ♂♂ in my net when catching a ♀. The peculiar thick hair on the underside of the forewing (costal and hind margins and partly median area, hindwing basal half) is also remarkable. *shamyl* shares this peculiarity with other species which have pointed wings, e. g. the gigantic *Zel. stacii* from Australia and *Leto venus* from South Africa, which is according to SCHAPOSCHNIKOW a means of rendering the flight noiseless.

regius. **P. regius** *Stgr.* (54 b). The series closes with this most beautiful of all Palearctic Hepialids, which has a right to its name, being clad in purple and gold. Size up to 67 mm, forewing brownish grey, spots edged with white and partly covered with gold. Hindwing smoky grey, the basal area as well as the upper three or four segments of the abdomen more or less shot with carmine. The ♂ is apparently characterised by the more golden ornamentation of the forewing and the ♀ by the more beautiful red of the hindwing. A ♂ in my collection, caught at Sining (Tibet) at the beginning of July, has the forewing very strongly gilt, but the hindwing almost white, only bearing red hair at the hind margin and slight red markings at the costal margin, especially in the apical region; the red suffusion on the abdomen, on the other hand, extends to the thorax (which is normally yellowish grey). *P. regius* is still rare in collections, for it inhabits the most distant parts of Tibet (Amdo). It was first found in 1892 to 93 between Lob Nor and Kuku Nor by the collector E. RÜCK- *roseus.* BEIL and was described by Dr. STAUDINGER. OBERTHÜR gives the name **roseus** to a form in which the forewing is pale and scarcely metallic, but the hindwing uniformly rose-red; it occurs at the Tibetan frontier of China.

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*) Cf. Duftorgan *P. shamyl* von Dr. P. DEEGENER in the Zeitschrift für Wiss. Zoologie LXXVIII, 2: exact description and figure.

Alphabetical List

of the forms of Palearctic Hepialidae with a reference to the original descriptions.

* signifies that the form is figured at the place quoted.

algeriensis Hep. *Joann.* Ann. Soc. Ent. Fr. 1903. p. 223.
alticola Hep. *Oberth.* Ann. Soc. Ent. Fr. 1881, p. 527.
amasinus Hep. *H.-Schäff.* (Hepialid. 7) 6, p. 39.
armoricanus Hep. *Oberth.* Ét. Lép. Comp. 3, p. 411. *
ascoldensis Hep. *Stgr.* Rom. Mém. Lép. 3, p. 193. *
azuga Hep. *Car.*, Iris 8, p. 83 (1895).

camphorae Phass. *Sasake*, Tokyo Nip. Konch. p. 81 (1908).
carna Hep. *Esp.* Eur. Schmett. Abbild. IV. *
castillanus Hep. *Oberth.* Ét. d'Ent. 7, p. 13. *

dacicus Hep. *Carad.* Soc. Entom. 8, p. 44.

excrescens Phass. *Butl.* Ann. Mag. Nat. Hist. (4) 20, p. 482.

flina Hep. *Geyer*, Eur. Schmett. Bomb. *
fusconebulosa Hep. *Degeer*, Mém. 8, p. 548. *

gallicus Hep. *Led.* Verh. zool.-bot. Ges. Wien 1852, p. 106.
ganna Hep. *Hbn.* Smlg. Eur. Schmett. Bomb. *
gerda Hep. *Stgr.* Iris 10, p. 328.
grandis Hep. *Pfitzn.* in Seitz, Macrolep. 2, p. 434. *

hecta Hep. *L.* Syst. Nat. (I) App. p. 822.
herzi Phass. *Fixs.* Rom. Mém. Lép. 3, p. 335. *
hethlandica Hep. *Stgr.* Cat. Schmett. Pol. (II), p. 60.
humuli Hep. *L.* Syst. Nat. (X), p. 508.

laetus Hep. *Stgr.* Stett. Zg. 1877, p. 177.
lupulinus Hep. *L.* Syst. Nat. (I), p. 508.

macilentus Hep. *Ev.* Bull. Mosc. 1851, p. 626.
mlokossewitschi Hep. *Rom.* Mém. Lép. 1. p. 91. *

nebulosus Hep. *Alph.* Rom. Mém. Lép. 5, p. 85.
nepalensis Phass. *Walk.* Cat. Lep. Het. Br. Mus. 7, p. 1557.
niphonica Gorg. *Butl.* Ann. Mag. Nat. H. 4. 1879, p. 357.
nubifer Hep. *Led.* Verh. zool.-bot. Ges. Wien 1853, p. 362. *

pallidus Hep. *Hormuz.* Ent. Nachr. 1894, p. 7.
pyrenaicus Hep. *Donz.* Ann. Soc. Ent. Fr. 1838, p. 129. *

regius Phass. *Stgr.* Iris 8, p. 301. *
ronin Palp. *Pfitzn.* in Seitz, Macrolep. 2, p. 437. *
roseus Phass. *Oberth.*

schamyl Phass. *Christ.* Hor. Ent. Ross. 22. p. 309.
sexnotatus Palp. *Moore*, Proc. Zool. Soc. Lond. 1879, p. 413.
signifer Phass. *Walk.* Cat. Lep. Het. Br. Mus. 7, p. 1568.
sinensis Phass. *Moore*, Ann. Mag. N. H. (4). 20. p. 91 (1877).
sylvinus Hep. *L.* Faun. Suec. p. 306.

uralensis Hep. *Gr.-Grsh.* Ann. Mus. Pétersb. 4, p. 469.

variabilis Hep. *Brem.* Bull. Akad. Petrop. 3, p. 478.
varius Hep. *Stgr.* Rom. Mém. Lép. 3, p. 191. *

Errata and Addenda to Vol. 2.

Beside the Addenda inserted at their respective places (pages 31, 108, 179 and 270) the following corrections are necessary, most of which were occasioned by publications issued during or after the issue of our descriptions.

p. 7. l. 23 from bottom: efface the reference (1 d) behind *chloronota*.

p. 10. add to *Eterusia*:

E. culoti *Oberth.* (56 k). A species which is Indian in facies and only approaches the Palearctic boundary. *culoti.*

E. lacreuzei *Oberth.* (56 i). Also from China; may best be placed between *sublutea Walk.* and *rajah Moore.* *lacreuzei.*

E. moerens *Oberth.* (56 i). A small form; forewing brown, hindwing dull ochreous with dark outer margin. — From Tse-ku. *moerens.*

7ª Genus: **Psaphis**

P. refousi *Oberth.* (56 i). A mimic of Danaids, and would perhaps be more naturally placed with *Cadphises* (cf. Vol. 10, Plate 5 e). Figure copied from OBERTHÜR. — China. *refousi.*

Rhodopsona. On Plate 77 fig. 696 (Ét. Lép. Comp. V (1)) OBERTHÜR figures a pale, more yellowish red ♀ of *Ph. costata Walk.* (2 c), from the Western boundary of Tibet, which he names **jordani.** — In a second specimen, from Siao-lu, the arc-shaped stripe is vermilion, and the collar not red, but like the rest of the thorax, dark brown. *jordani.*

P. 17. l. 18 from top behind *fusca* read (3 g) for (3 h).

P. 17. l. 20 from top behind *syfanicum* read (3 h) for 3 i).

P. 18. To **Zygaena.**

In the introduction to the genus *Zygaena* I drew attention to the fact that yellow specimens of most red *Zygaena* have been caught as exceptions, as have also specimens with five spots belonging to six-spotted species and vice versa; moreover, that the abdomen may be without belts in species where the latter is usually present, and, inversely, may occasionally be belted where normally it is black. We considered this statement sufficient and did not think it necessary to give names to all those regularly recurring aberrations in cases where they had not already received names. In the meantime quite a number of these exceptional forms have been provided with names, as follows:

Z. purpuralis **lutescens** *Tutt.* Wings light ochreous, the forewing with a dark margin. — **marginata** (= polygalae *Esp.*) is the name given by BURGEFF to specimens of *purpuralis* with dark-edged forewing. — In **dilata** *Burg.* the median spot is broadened; in the form *confluens* the five spots of the forewing merge together to form three; about the same being the case in *pluto O.* (= pythia *Hbn.*); in **grisescens** the collar and patagia as well as the dark portion of the forewing are variegated with whitish scales. In BURGEFF's paper in Entom. Zeitschr. vol. 20, no. 22, under "6. forma *grisescens*" it should read "*collari* (not alis) scapulisque albidis". — Beside the red-belted form which I have mentioned under the name of "*cingulata Burgeff*" (p. 19), a form also occurs with red anal claspers, which was caught in Bohemia, and which BURGEFF calls **rubrianata.** — **graeca** *Dziurz.* is founded on small specimens from the Parnassus and Velucci Mts.; the bluish black ground-colour of its ♀♀ shows an inclination to become whitish; otherwise scarcely different. — The yellow form of *smirnowi* has been named **flava** *Dziurz.* *lutescens. marginata. dilata. grisescens. rubrianata. graeca. flava.*

Z. brizae. "Seitz" must be put as the author of *cingulata*, as ab. *cingulata* "Dziurzynsky" is a nomen nudum, respectively a nomen in lit. — *brizae* with red anal claspers is **rubrianata** *Burg.* — Specimens in which all the spots are merged together are named **confluens** by DZIURZYNSKY (Berl. Entom. Zeitschr. 1908). *rubrianata. confluens.*

Z. zuleima. DZIURZYNSKY has given the name "forma **confluens**" to an aberration of this species also. *confluens.*

To *scabiosae.* — On plate 56 h we figure the very much blackened form *hoffmanni.*

P. 20. *Z. favonia.* — ab. **powelli** *Oberth.* is the form with the spots yellow instead of red. *powelli.*

P. 20. l. 16 from below, behind *staudingeri* read (4 g) for (4 f).

P. 21. DZIURZYNSKY gives the name ab. **sexmacula** to specimens of *Z. wagneri* with six spots. *sexmacula.*

incarnata. semilutescens. extrema. sexmaculata. nigricans.

P. 21. *Z. trifolii.* – In **incarnata** *Turati* the spots of the hindwing are flesh-red. — ab. **semilutescens** *Higgs.* is the name proposed for specimens with orange-coloured base to the hindwing; from England. — In **extrema** *Tutt* (= marginata *Burgeff*) all the spots of the forewing are merged together and so extended that only a narrow dark stripe remain at the distal and hind margins. — The six-spotted form of this species is **sexmaculata** *Oberth.*. and an aberration of this form with confluent spots = ab. **sexmaculata confluens** *Oberth.* The darker form with blackened hindwing = ab. **nigricans** *Oberth.*

P. 21. l. 6 from below. Insert author's name "Speyer" behind *citrina.*

semilutescens. lutescens. latomarginata. cuneata. centripuncta. australis. duponcheliana. olbiana. incendium.

Z. lonicerae Schev. A number of aberrations additional to those mentioned on page 21 have received names: ab. **semilutescens** *Hewett*, from England. with orange-yellow base of hindwing. — The entire hindwing is orange yellow in ab. **lutescens** *Hewett*; founded on a single specimen from England. — ab. **latomarginata** *Tutt* has the margin of the hindwing particularly broad. — ab. **cuneata** *Tutt* has the costal marginal spot produced in wedge-shape. — In ab. **centripuncta** *Tutt* the middle pair of spots is connected. — Oberthür restricts the name *syracusiae* to Sicilian specimens. and names the Mauretanian form of *trifolii* **australis.** — Another form deviating from the type but very slightly he calls **duponcheliana**, and **olbiana** *Oberth.* are larger, more robust, deeper coloured specimens from Hyères in South France.

Oberthür also gives the name ab. **incendium** to an aberration of *Z. lonicerae* in which all the red spots of the forewing are merged together to form a large patch.

carnea. cingulata.

P. 22. — *Z. angelicae O.* — Dziurzynsky erects the form **carnea** *form. nov.* for flesh-coloured specimens, and **cingulata** for belted examples.

nigrata. oberthueri. rubra. siepii.

L. stoechadis Borkh. — **nigrata** *Dziurz.* are specimens with the hindwing entirely black or with only traces of red. — Specimens with six spots = **oberthueri** *Dziurz.* — Dziurzynsky give the name **rubra** to specimens resembling *hadjina*, but with larger carmine not brick-red spots on the forewing; they are said to be from Spain and Southern France. — Specimens of the form *dubia* with yellow spots are ab. **siepii** *Oberth.*

cynarae. confluens. rubrianata.

To Z. **cynarae** add the forms ab. **confluens** *Burgeff* and ab. **rubrianata** *Burgeff* with confluent spots and red anal claspers respectively.

conjuncta.

To *Z. anthyllidis Bdv.* belongs also the form **conjuncta** *Dziurz.* with confluent spots. — On the other hand *ab. flava* Oberth. is not the yellow form of *anthyllidis* (as I copied from Staudinger-Rebel), but belongs to *Z. exulans.*

intermedia. aurantia. miniata grisescens.

Z. filipendulae L. — P. 22. line 3 from bottom read Robson for Hobson. — The following forms also belong here: ab. **intermedia** *Tutt*, red tinged with yellowish brown; ab. **aurantia** *Tutt*, orange-red; ab. **miniata** *Tutt*. vermilion. — **grisescens** *Oberth.* Forewing greyish blue, hindwing pale pink; from England. *latoconfluens Kelecz* and others. — Oberthür (Et. Lép. Comp. I, p. 564) also tabulates the following forms:

1. *syriaca Oberth.* (forma 6-maculata)
   (forma 6-maculata confluens) = ramburi *H.-Schäff.*
   (forma 5-maculata maculata)
2. *ramburi Led.*
3. *gurda Led.* (= messina *H.-Schäff.*)
4. *rosa Oberth.*

P. 22 behind *Z. cynarae* read (5 b, c) for (5 b).

Line 2 from bottom behind *chrysanthemi* read (5 f) for (5 e).

italica. taurica. sexmacula alpina. centralis. occidentalis. vigei. pallidior. rosea. provincialis. semicingulata.

P. 23. *Z. transalpina Esp.* Specimens in which spot 6 is absent above, but not entirely so beneath, are ab. **italica** *Dziurz.* — **taurica** *Dziurz.* has brick-red spots. — ab. **flava** *Dziurz.*, the lemon yellow form, comes from Preth (Austria). — ab. **sexmacula** *Dziurz.* like *sorrentina*, but with six spots. — ab. **alpina** *Bdv.* more carmine. — ab. **centralis** *Oberth.*, the two outer spots merge together to form a heart. — In ab. **occidentalis** *Oberth.* all the red colour is brownish, in **vigei** *Oberth.* it is orange. — **pallidior** *Oberth.* is founded on small specimens from Dompierre-sur-mer. in which the entire forewing is tinged with reddish yellow; only the outer margin is narrowly blackish blue. — **rosea** *Oberth.* is pale rose-red. — ab. **provincialis** *Oberth.* is wine-red, very small and with very small spots. France in September; probably a starved brood in which the moths develop in the autumn instead of the larvae hibernating. — **semicingulata** *Oberth.* has a red abdominal belt.

crocea.

P. 23. *Z. dorycnii O.* has an orange to ochreous form, = ab. **crocea** *Schultz.*

scheveni. esperi.

P. 23. *Z. ephialtes L.* The typical form is described as follows: Forewing with six red spots, hindwing with one white one; abdomen with red belt. As *ephialtes Schev.* differs from the typical form, the former is named *Z.* **scheveni** by Oberthür and is characterised as follows: forewing with six spots, the two basal ones of which are red, the four distal ones white with red centre. — **esperi** *Oberth.* similar but without red centre in the white spots. — **sophiae** *Favre* like the preceding, the white spots of the forewing with or without pupils; hindwing with two white spots instead of one. — *falcatae Bdv.* is not like *ephialtes L.*, but like *medusa Pall.* — ab. **wullschlegeli** *Oberth.* is an entirely black aberration without spots; from the Vallais. — Oberthür pronounces the moth described by me as *icterica* (plate 6 A) to be different from the typical *icterica* and names it **adalberti**. — ab. **pallens** *Oberth.* Spots of hindwing and of base of forewing red, the other spots of the forewing white. — **pallida** *Oberth.* similar, the white spots of the forewing tinged with red.

wullschlegeli.
adalberti.
pallens.
pallida.

P. 24 l. 7 from top for *princi* read *prinzi*.

l. 10 from top behind *athamanthae* read (6 b) for (6 c).

Z. exulans Hochenw. The name *confluens Dziurz.* must give place to the older one of **striata** *Tutt*, but ab. **confluens** Strand remains as name of the corresponding aberration of *vanadis*. — **pulchra** *Tutt*, thorax and forewing dusted with yellow in places, this giving the moth a variegated appearance. — ab. **pallida** *Tutt* are faintly marked specimens, ab. **minor** *Tutt* smaller examples. — ab. **clara** *Tutt* has a greenish grey ground-colour and a distinct dark margin to the hindwing.

striata.
confluens.
pulchra.
pallida.
minor.
clara.

L. 18 from bottom, behind *vanadis* read (6 c).

P. 25. *Z. meliloti Esp.* — ab. **confluens** *Tutt*, all five spots of the forewing merged together. — While the name *stentzii* only applies to belted specimens of the typical form, belted specimens of *dahurica* are known as ab. **dacica** *Car.*

confluens.
dacica.

Z. **laphria** *Frr.*, according to recent statements by Burgeff, is a distinct and well characterised form and not identical with *ledereri*.

laphria.

Z. oxytropis Bdv. — Specimens in which the spots of the forewing merge together in pairs are **conjuncta** *Spul.*

conjuncta.

Z. lavandulae Esp. — A very peculiar moth which probably belongs here has been found by Rothschild and Jordan in Algeria; like *lavandulae*, but without the red spot of the hindwing and with the antennae almost as long as the forewing; it is **theryi** *Joann.*

theryi.

P. 26. l. 3 from top, behind *consobrina* read (6 g) for (6 f).

A yellow form of *rhadamanthus* is also known now, this is ab. **flava** *Oberth.*, found in Spain. — In the form **guenei** *Oberth.* the ground-colour of the forewing is somewhat lighter grey; from Digne.

flava.
guenei.

Z. mitisi. We give a figure on plate 56 h.

Z. cuvieri Bdv. Specimens are known from the Lebanon with the forewing entirely red, only the apex being black. This is ab. **totarubra** *Dziurz.*

totarubra.

Behind *tamara rubra* for *Bang-H.* read *Rebel.*

Z. cambysea; specimens, with red belts are ab. **cingulata** *Dziurz.*

cingulata.

Z. cacuminum; specimens without red belts are ab. **nigra** *Dziurz.*

nigra.

P. 27. According to Dr. Burgeff the form *ignifera Korb* has nothing to do with *laeta*, but is allied to the African *algira*.

Z. lydia Stgr. — *cremonae Stgr.* is an i. l. name, the author's name therefore is "Seitz".

Z. achilleae Esp. — To ab. *flava* Spuler add ab. **fulva**, in which the yellow spots are slightly dusted with reddish. — ab. **blachieri** are specimens (mostly ♀♀) in which the spots of the forewing are smaller and spot 3 is entirely absent.

fulva.
blachieri.

Z. armena Ev. — Dziurzynsky gives the name **alpina** to alpine specimens which are more hairy, have darker ground-colour and very slight edges to the spots of the forewing.

alpina.

P. 28. *Z. scovitzi.* ab. **alba** *Dziurz.* are specimens in which the white edges of the spots are very much broader, nearly as in the form *amoena* of *carniolica*. — in **confluens** *Dziurz.* the red spots are confluent.

alba.
confluens.

L. 8 from top; behind *kavrigini* read (7 g) for (7 f, g).

Z. olivieri Bdv. — In **confluens** *Dziurz.* the spots are confluent.

confluens.

Z. ganymedes H.-Schäff. — In **algarvensis** *Dziurz.* which, however, flies among typical specimens in Asia Minor and not in Portugal, the spots of the forewing are white; in **confluens** *Dziurz.* they are confluent.

algarvensis.
confluens.

Oberthür gives the name ab. **foulquieri** to yellow specimens of *hilaris*, and **confluens** to those with confluent spots, while Dziurzynsky names another form *ononidis*.

foulquieri.
confluens.

P. 28. l. 1 from bottom behind "form" add: "likewise ab. **pallida**, which Oberthür figures as the yellow form".

pallida.

P. 29. l. 30 from top, behind *fausta* read (8 l, e) for (8 b).

P. 29. Specimens of *fausta* with almost entirely white submarginal spot on the forewing are ab.
dupuyi. **dupuyi** *Oberth.* — Inversely, in **melusina** *Oberth.* the white colour is entirely absent in the forewing and there
melusina. is only a little yellow tint in the red. — Small specimens are called *pygmaeoides Blach.*

venusta. To *carniolica Scop.* — ab. **venusta** *Schultz* is a very beautiful variety, bright red in colour with a
drastichi. broad yellow belt. — In **drastichi** *Hirschke* spot 3 of the forewing is reduced to a light dot or is entirely
tricolor. absent. — **tricolor** *Oberth.* is a transition to *amoena* in which the dark ground-colour is superseded by white.
vangeli. — **vangeli** *Aign.* is an aberration in which the spots of the forewing have no white edge, while the abdomen bears a red belt. —

P. 30. To *carniolica* ab. *amoena.* As the specimens figured on plate 8 e, f are really only transitions to *amoena Stgr.* we give another figure, of a more typical specimen, on plate 56 h. — To *orana*
powelli. add **powelli** *Oberth.*, an African form, closely allied to the form *albicans* of *occitanica.* — In **lahayi** *Oberth.* the
lahayi. white of the forewing is nearly or quite absent. — OBERTHÜR also distinguishes a form **dupuyi** of *carniolica*,
dupuyi. having the outer spot of the forewing white; from Digne. — In *carn. bicolor Oberth.* the middle spots are confluent and the light edges of the spots absent, also from Digne in South France, which is a locality much frequented by collectors.

A. SEITZ.

P. 35. **Epicopeidae.**

K. GRÜNBERG (Deutsche Entom. Zeitschr. 1908) has compared the various characters of the *Epicopeidae* with those of the other groups of Heterocera, and thence has drawn the conclusion that the Epicopeidae should be placed between the Saturniids and the Uraniids.

Subgenus Epicopiopsis *Grünb.*

Dr. K. GRÜNBERG also proposes to separate the northern species **E. mencia** *Moore* and **E. hainesi** *Holl.* from the genus *Epicopeia* and to place them in a new genus, *Epicopiopsis*, which is characterised as follows: Spurs of middle and hind tibiae slighter than in *Epicopeia*; stripes of scales between the veins entirely absent; while in Epicopeia the fifth subcostal of the forewing originates very close to the stalk of branches 2, 3 and 4, rather far from the upper radial, in *Epicopiopsis* subcostal 5 closely approaches the upper radial (*mencia*) or is even stalked with it (*hainesi*); lastly, the hindwing of *Epicopiopsis* is really tailed, while in *Epicopeia* it is only more or less lobed in tail-shape. Dr. GRÜNBERG admits, however, that these characters are variable and therefore only of relative value, they are most strongly developed in *hainesi* and less prominent in *mencia*, so that the latter species is more or less intermediate. I am therefore of the opinion that this group of species should only be considered a subgenus.

P. 36. l. 18 from top, behind *caroli* add (10 b).

A. JANET.

P. 38. To *Syntomis phegea L.* A form with the vitreous white spots larger and more numerous
fenestrata. is described by RAMME as **fenestrata** (Inter. Entom. Zeitschr. Guben 5, p. 103 (1911)). — In ab. **seminigra**
seminigra. *Spul.* there are spots on the hindwing, but not on the forewing.

tricingulata. P. 39. To *Syntomis antiochera Led.* — **tricingulata** *Cul.* probably belongs to *antiochena*, the last 3 abdominal segments bear yellowish white belts; described from Beyrut.

L. 11 from top for *cocandina* read *cocandica.*

minuta. To *Syntomis caspia Stgr.* — **minuta** *Bang-H.*, from Transcaspia, is allied to *caspia Stgr.*, but is smaller, and instead of the small white spot at the base of the forewing has a rather large rhombiform patch with sharp corners.

P. 39. l. 4 from bottom add (9 f) behind *masoni.*

nigricauda. To *Sytomis germanta Feld.* MYAKE gives the name ab. **nigricauda** to Japanese specimens with the apex of the abdomen black (Annot. Zool. Jap. 1907, p. 161).

Insert here:

jankowskii. **Syntomis jankowskii** *Rothsch.* From I-chang, resembles *paxa* (9g), but the wings are more rounded. Frons blackish brown and patagia golden yellow (in *paxa* the inverse is the case). The yellow abdominal belt on the basal segment surrounds the latter entirely, not only dorsally; vitreous spots lighter and clearer.

Of *S. alicia Butl.*, which is figured in Vol. 14 of the Macrolepidoptera, a variety occurs on Palearctic
mogadorensis. territory which is called **mogadorensis** *Blach.* The markings of the forewing of this species recall a large-spotted *phegea*; the entire basal half of the hindwing is hyaline white. Segments 1, 3, 4 and 5 of the abdomen are coppery red, the remainder metallic blackish blue. Discovered by VAUCHER, it was caught in a locality which is nearer marakesh than magador.

S. leechi *Rothsch.* Like *acrospila Feld.* (9 h), but the ground-colour lighter, more brown than black, the yellow abdominal rings are broader, the vitreous spots tinged with yellow, the interspace above the submedian vein quite transparent yellow, only interrupted by a narrow transverse bar. — From the Wa-shan in Western China. *leechi.*

S. melanocera *Hamps.*, from North China, not known to me. Recognisable by the entirely black antennae. *melanocera.*

S. perixanthia Hamps. On page 39 we mentioned two localities for this species, Western China and Formosa. Rothschild has recently differentiated two forms; he retains the name *perixanthia* for the smaller form from Formosa and names the considerably larger one from Western China **sinensis**. Our figure (9 f) belongs to the latter. *sinensis.*

P. 41.

2b Genus: **Eressa** *Walk.*

This genus is to be placed between *Ceryx* and *Dysauxes*, and contains forty forms, all of which inhabit the Indo-Australian and Ethiopian Regions. Only one species extends on to Palearctic territory.

Eressa multigutta *Walk.* (= blanchardi *Pouj.*). This Syntomid, figured on plate 9 h, inhabits South Tibet. It is at once distinguished from all other Palearctic Syntomids by the yellow abdominal belts being interrupted by black dorsal spots. The home of this species is Further India rather than the Palearctic Region. *multigutta.*

To *Dysauxes punctata.* — **ochrea** *Mill.* has the spots of the forewing yellow instead of whitish. *ochrea.*
— — **juncta** *Hafn.* has confluent spots. *juncta.*
— — **kashmiriensis** *Rothsch.* is larger, with broader wings; the light spots of the forewing and the band of the hindwing are more extended than in true *punctata.* Goorais-Valley. *kashmiriensis.*

P. 44. behind *cuculatella* read (10 c) for (10 b).

P. 45. behind *scripta* read (10 d) for (10 c).

P. 49. l. 24 from bottom *Poecilonola* read **Poecinola.**

To *Psilopepla margaritacea.* For the figure of this essentially Indian species cf. Vol. 10, pl. 10, 18 k.

P. 58. l. 11 from top. For *celipoda* read *celidopa.*

To *Lyclene rubricosa Moore.* For the figure of this almost exclusively Indian species and of the form *ochracea* cf. Vol. 10, pl. 17 i.

P. 60, l. 14 from bottom, for ab. *fumosa* read ab. **brunnea.**

To **Chionaema.** For the numerous Indian species of this genus cf. Vol. 10, pls. 16 and 17.

P. 69. To *Lithosia nigripars Walk.*, cf. figure, Vol. 10, pl. 15 l.
To *Lith. vagesa Moore.* The form *innotata* of this species is figured Vol. 10. pl. 14 k.

P. 71. *Eligma narcissus.* As the result of recent investigations this genus is now placed among the Noctuidae in the subfamily *Euteliinae.* It is therefore again dealt with in Vol. 3, p. 291.

P. 72. *Coscinia striata xanthoptera Oberth.* While discussing this form recently, Oberthür mentioned an aberration in which the collar is absent; the specimen is a ♀.

P. 72, l. 13 from top. Behind *intermedia* read (13 f) for (13 b).

Coscina cribraria. Oberthür proposes a number of new names for forms of this species, among them **inquinata** and **nevadensis** for *colon*-forms. A form resembling typical *cribraria*, but in which there are only shadowy stripes between the veins, is named **anglica.** — In **vernetensis** the forewing in the ♂ is suffused with grey, in the ♀ it is white with faint spots. — **rondoui** resembles *rippertii*, but has stronger black spots. — In **leucomelas,** from Cantares, the ground-colour is darker at the outer margin and lighter towards the base. — **canigulensis** looks like a small *rippertii.* *inquinata. nevadensis. anglica. vernetensis. rondoui. leucomelas. canigulensis.*

P. 73. **Utetheisa thyter** is not considered as a form of *pulchella* by Rothschild in Vol. 10. The black spots of the forewing are mostly absent. — In *semisignata Spul.* they are confined to the outer portion of the forewing. — According to Oberthür a new form must now be added in which the small black spots in the median area of the forewing are absent.

P. 75. *Kerala macroptera Oberth.* When dealing with this moth we pointed out that it would be better placed with the Noctuids near the *Cymbidae*, but described it in the present volume in order to avoid clashing with Staudinger's Catalogue. In the meantime Hampson has put the insect in the place suggested, and we therefore describe it again among the Noctuids, and give a figure taken from nature (vol. 3, pl. 52 n.) — The same also applies to *Pseudosterrha oranaria Luc.*

confluens. *paucimaculata.* P. 78. *Cletis maculosa.* — We placed *reticulata Christ.* as a synonym of *dahurica Bdv.*, but OBERTHÜR considers this form different from *dachurica Bdv.* on account of its weaker markings. — A colour-aberration in which two spots are confluent is named ab. **confluens**, a very faintly spotted specimen from Digne ab. **paucimaculata**, etc.

powelli. P. 79. To **Trichosoma** OBERTHÜR add **powelli**. We give the figure on plate 56 k, which represents a ♂. The ♀ has a very narrow lanceolate forewing, which is, however, similar in colouring and markings to that of the ♂, its hindwing is atrophied; from Algeria.

fere-immaculata. *wullschlegeli.* *rosea.* *irregularis.* *obscura.* *flavescens.* *amoena.* P. 80. *Eucharia casta Esp.* For the numerous variations of this species OBERTHÜR proposes quite a number of additional names. ab. **fere-immaculata** has only a few small black dots in the disc of the forewing. The form is founded on a ♂; a ♀ almost agreeing with this ♂ received the name **wullschlegeli**. — ab. **rosea** is a ♂ tinged with red. — In **irregularis** the median band of the forewing consists of transverse spots. — In ab. **obscura** the white of the ground-colour is dulled. — A ♀ with yellow hindwing, to which OSCAR SCHULTZ already gave the name ab. *lutea*, OBERTHÜR now calls ab. **flavescens**. — ab. **amoena** is a very pretty form with rosy whitish outer margin of the forewing.

pudica. *flavescens.* To *Euprepria pudica*. A form of this species dusted with grey is described by OBERTHÜR as ab. **fumosa**, and a similar one with yellow instead of white ground-colour of the forewing as ab. **flavescens**.

Behind *Eupr. rivularis Men.*, *pudica Esp.* and *oertzeni Led.* read (16 d) for (16 e).

P. 83. *Micrarctia postflavida Hamps.* This beautiful moth also occurs in North India. We bring a figure of it in Vol. 10, plate 19, taken from the specimen in the British Museum.

P. 85. *Spilarctia melanostigma.* Insert (56 h) behind the name.

P. 86. *Spilarctia* **pseudolutea** *Rothsch.*, from Japan, comes nearest to *Sp. stigmata Moore.* As the name implies, it resembles *lubricipeda* (= lutea *Hufn.*); it is light lemon-yellow, before the middle of the wing there is a curved line of small blackish brown spots from the subcostal to the middle of the inner margin. At veins 4, 5 and 6 pairs of dark striae, also on both sides of vein 7. Hindwing with a spot in the cell and at vein 5, and a row of spots from vein 3 to the anal angle. The species is more fully described by ROTHSCHILD in Vol. 10, and figured in Vol. 10, plate 19 b.

quercii. *Spil.* **quercii** *Oberth.* is best placed behind *comma*; it is similar to this species, but the costal and hind-marginal spots are longer; from the hind-marginal streak an oblique row of spots extends to the apex. — From Siao-lu.

gianelli. *Spil.* **gianelli** *Oberth.* On plate 56 i we give a copy from OBERTHÜR's figure of this recently described species.

L. 11 from bottom. Behind *bifasciata* insert (15 e, d) for (15 d).

vialis. *Spil.* **vialis** *Oberth.*, from Ta-tsien-lu, recently described, resembles *flaveola* (15 d), but is less strongly marked.

aurocostata. *Spil.* **aurocostata** *Oberth.* (56 i) also comes from Ta-tsien-lu.

nehallenia. P. 87. *Spil.* **nehallenia** *Oberth.* Resembles *lewesi Butl.* (15 e), but the linear spot in the cell is reduced to traces along the median vein. — Ta-tsien-lu.

rostagnoi. *Spil.* **rostagnoi** *Oberth.* agrees with *multiguttata Walk.*, but the forewing is creamy white; from Siao-lu, Chang-ku. Also compare figures in Vol. 10, plate 22 a, and the text by W. ROTHSCHILD.

P. 88. *Spil. melanosoma Hamps.*; insert (15 h) for (15 g).

anopunctata. *Alphaea* **anopunctata** *Oberth.*, like *fulvohirta Walk.* (15 h), but the dark reticulations duller and the thorax white with faint black spots. From Tse-ku in Yunnan; can scarcely be included among the Palearctics.

P. 91. *Areas galaetina* and *trigonalis*; cf. figures in Vol. 10, plate 25 c.

puella. P. 89. *A.* **puella** *Bang-Haas.* We give a figure on plate 56 g. The species is allied to *A. unifascia.*

P. 95. *Hypophoraia seitzi Bang-Haas.* The original was kindly lent to us for the figure, a good one, which we give on pl. 56 g.

P. 97. To *Preparctia.* — This genus now contains three species instead of two. The third species, **hannyngtoni** *Hamps.* is figured in Vol. 10, on plate 19 a; it is not Palearctic.

P. 98. To *Arctia dido Wagn.* — The egg globular, yellow, becoming grey before the larva emerges. The latter has been described and figured by Lucas and Joannis: when full-grown it is about 4 or 5 cm long, dark brown with black head and dense black tufts of hair. The hairs are rather short behind the head, becoming gradually longer dorsally until on the four last abdominal segments they are as long as in the larva of our *A. caja*. From June until the following spring, when it pupates, the chrysalis being black brown.

Arctia caja orientalis Moore; cf. figure in Vol. 10, plate 24 i.

P. 100, l. 10 from top: after *A. hebe* insert the plate-reference (18 d).

P. 101, l. 32 from top. Behind *insubrica* insert as plate-reference (18 d, as *bithynica*).

According to later communications from Herr Bartel *Callim. philippsi* is certainly a distinct species. Moreover, it is in facies more like a *dominula* than a *quadripunctaria*, but the light spots of the blackish green forewing are quite different in shape. The type is in the collection of Herr Philipps in Cologne.

P. 102. *Estigmene* **turatii** *Oberth.* is said to be like *principalis*, but to have the hindwing al- *turatii.*
most entirely black, with very few light spots. — From Siao-lu.

P. 117, line 21 from bottom: delete (22 c) behind *confinis*.

P. 122. l. 19 from bottom; behind *japonibia* read (19 i ♂, 22 e ♀) and not (19 i ♂, 21 c ♀).

P. 123 behind *heterogyna* and *alba* for (22 c) read (22 e).

P. 124, l. 5 from top. — According to Bang-Haas the white form (*albida*), from Karagaitan, is quite distinct from true *cretacea*.

P. 126. l. 21 from bottom. behind *biseparata* read (22 g) for (22 f). — Behind *albofascia* delete (22 e), but leave (20 c).

P. 132. To *O. flavipalpata* add that, according to Bang-Haas, a darker form occurs in Egypt.

P. 136. A form with very strongly contrasting colouring, dark olive green forewing and bright yellow hindwing has been sent to me by Herr Bang-Haas. It belongs to the very variable *Euproctis niphonis*; we figure it on plate 56.

P. 137, l. 1 from bottom. behind *E. argentata* delete (23 b).

P. 144. A very large form of *Thaumatopoea* from South Eastern Europe, the largest Palearc-
tic form of the family, is figured on plate 23 c and e: it was sent to me by Herr Bang-Haas, named **extrema**. *extrema.*

P. 152. To *Trichiura crataegi L.* A ♂ from Sajan, sent to me by Herr Bang-Haas is very differ-
ent from European specimens in colour, being dark bluish green (not yellowish brown). Assuming this to be
the case in all specimens from that locality, I name the form **scytharum** *subsp. nov.* *scytharum.*

Mal. franconia panormitana Turati, read (24 e) for (24 f).

P. 153. *Trich. ilicis Ramb.*, for (24 c) read (24 i).

P. 154. l. 23 from top read Bartel for Bertol.

A. Seitz.

P. 156. *Lasiocampa quercus L.* — Dormal, in Rev. mens. Soc. ent., Namur, vol. 10, 1910, p. 2,
describes a small form from Namur as ab. **pusilla**. The only distinguishing character, a considerable difference *pusilla.*
in size, scarcely justifies a special name. — The name ab.-♂ **femini-colorata** *Niepelt* (Intern. Entom. Zeitschr. Guben, 5 (1911) page 186) must be sunk, as it has afterwards been discovered that the specimens were artificially discoloured.

P. 157. Behind *altaica* insert reference (25 c).

P. 159. *Lasiocampa serrula Guen.* ab. **seileri** *Stertz* (Iris, vol. 26. 1912, p. 27, pl. 3, fg. 3 to 5). Outer *seileri.*
half of forewing yellowish white to the margin, slightly dusted with grey close to the fringes; basal area of wing light grey or more rarely bright light brown. Hindwing also lighter in accordance with the colour of the forewing, as in *L. davidis*. According to Stertz the species varies considerably, especially in the ♂ sex, from bright light grey or greyish blue to dirty leather-yellow.

P. 160. *Lasiocampa davidis Stgr.* ab. **schulzi** *Stertz* (Iris vol. 26, 1912, p. 27, plate 3, fig. 1 and 2). *schulzi.*
Colour of both wings pure yellowish white with obsolete or entirely obsolescent bands; the small white discal spot absent. — According to Stertz (l. c.) *L. davidis* is very variable, changing from predominantly yellowish white to yellow and brownish pink. According to the same author as well as according to a communication in lit. of Herr Paulus, Secretary to the German Consulate at Jerusalem, the ♂ and ♀ figures on plate 26 a described as *palaestinensis* represent *L. davidis*, while the figure marked *davidis* (plate 25 f), represents

L. grandis ab. *sapiens*. — The figure of *L. josua* (plate 26 a), represents *L. serrula palaestinensis*, also according to Stertz and Paulus. — The references behind *josua* should therefore be deleted, and (25 f) and (26 a) be inserted behind *sapiens* and *davidis* respectively. — *L decolorata Klug*: In Iris, vol. 26, 1912, p. 28, Stertz describes the figure on plate 26 a as being rather inexact and says that specimens of *L. decolorata* from Palestine are cream-coloured or pale yellow. Herr Paulus expressed a similar opinion. But the figure is taken from the type in the Kgl. Museum, Berlin, and this actually has the dirty yellowish grey colouring which is very well reproduced in our figure. The type comes from Egypt. It is possible that the species is somewhat lighter in colour in Palestine.

alfacaria. P. 161. *Macrothylacia rubi* var. **alfacaria** *Ribbe* (Iris, vol. 23, 1910, supplement II, p. 225). ♂ more yellowish than the typical form, with the bands of the forewing broader and somewhat straighter, hindwing unicolorous; ♀ likewise brownish yellow but entirely without bands. Andalusia. According to Ribbe *beyeri.* (l. c.) *digramma*, described from Morocco, also occurs in Andalusia. — *M. rubi* ab. **beyeri** *Linstow* (Internat. entom. Zeitschr. vol. 4, 1911, p. 290), a bred melanotic ♀. Body and wings greyish black, the two transverse stripes and the veins of the wings very slightly lighter and hardly discernible. Ground-colour of forewing slightly lighter outside the inner transverse stripe.

pallida. *M. rubi L.* ab. **pallida** *Thierry-Mieg* (Ann. Soc. Ent. Belg. vol. 54, 1910, p. 386), proposed for fig. 7, plate 94 in Millière's Iconographie. The specimen figured came from Austria.

Behind *korbi* insert reference (26 b).

To p. 162. For **Diplura** *Ramb.*, which as a genus is already twice preoccupied, insert the name **Dipluriella** proposed by Strand (Soc. Ent. vol. 25, 1910, p. 14).

oberthueri. P. 163. **Chilena oberthueri** *Lucas* (Bull. Ent. Soc. France, 1910, p. 71). Upper side of forewing white, the narrow grey band extending from the apex to the hind margin excurved between veins 3 and 5. Hindwing grey, clothed with white hair at the base. Underside like the upper, the band of the forewing somewhat paler. Antennae yellow, palpi white. Tibiae clothed with white hair above and reddish yellow below. Evidently closely allied to *Ch. obliquata Klug* from Egypt. — Tunis. Only the ♂ known.

decolor. To p. 164. *Cosmotriche potatoria L.* ab. **decolor** *Thierry-Mieg* (Ann. Soc. Ent. Belg. vol. 54, 1910, p. 386), proposed for fig. 8, plate 94 in Millières Iconographie. The specimen figured there came from Austria.

P. 164. Behind *feminalis* insert reference (26 f).

P. 165. A very peculiar form of *Selenophora lobulina* has been sent to me by Herr Bang-Haas as coming from the Ussuri. The dark median band is edged on both sides by chalky white curved lines consisting of small lunules, and the marginal area is suffused with light grey and transversed lengthways by a dark shadowy line. One ♂ is before me. A. Seitz.

P. 167. On plate 49 b we give a figure of *Epicnaptera alice* taken from a specimen kindly lent by Herr Bang-Haas.

To *Epicnaptera suberifolia Dup.* — Ribbe (Iris, vol. 23, 1910, Supplement II, p. 226) mentions that *rubescens.* two forms occur in Andalusia, one grey and the other reddish grey; the latter form he names ab. **rubescens**.

P. 171. *Dendrolimus pini L.* — In Iris vol. 22, 1909, p. 14 Marschner describes an aberrant, evidently melanistic, ♀ without giving it a name. The forewing is blackish brown, the white discal spot in the inner transverse band is absent, the band itself indistinct. In the marginal area the dark brown veins stand out distinctly from the blackish brown ground-colour. Marginal line and fringes darkened. Hindwing dark reddish brown, nearly as in *montana*, likewise the entire underside.

P. 175. l. 16 from top read *P. plagifera* (30 e) for (30 d). K. Grünberg.

P. 179. l. 3 from top, after *flavovittata* read (29 c) for (29 d).

P. 189. l. 20 from bottom, after *mori* read (35 e) for (35 a).

P. 191, l. 18 from top after *menciana* delete (30 b) and insert (30 c) after *lurida*.
After *apicalis* and *varians* read (35 f) for (30 f).

P. 199 l. 1 from top: Behind *thibetaria* insert (48 f), for *Leucodrepana thibetaria Pouj.* is identical with *Aeropteris thibetaria*, a moth which, on account of insufficient characterisation on the part of its author, was placed sometimes with the Drepanids, sometimes with the Uranids.

P. 201. Behind *Drepana acuminata* delete reference (48 b).

P. 207. For 12. Family read 13. Family.

P. 209. For "13. Family" read "14. Family".

P. 214. l. 26 from top, behind *damartis spec. nov.* for (34 d) read (32 d).

P. 218. l. 12 from bottom, behind *castanea Swinh.* put reference (32 e). Behind *simla* omit reference (35 a).

P. 229. The family "**Sphingidae**" should have received no number, as it does not belong to the "Bombyces" proper. It forms the second division of Heterocera.

P. 245. l. 17 from bottom, behind *austauti* read (39 a) for (38 a).

P. 245. l. 13 from bottom, behind *staudingeri* read (39 b).

P. 260. l. 10 from top behind *minor* read (42 d) for (42 c).
P. 276. *Acropteris thibetaria* cf. remarks on page 199.

P. 277. The name *Oberthueria* is preoccupied as a generic name (cf. p. 190) and we therefore propose the name **Methystria** nom. nov. (with reference to the undulating flight) for the species united under that name.

P. 278. Behind *hemimelaena* read reference (48 f) for 48 h).
Behind *erasaria* read (48 i), not (48 k).

P. 287. l. 11 from top, behind *fuscinula* read reference (44 d).
l. 3 from bottom, behind *erminea* read (44 d, e) for (44 d).

P. 288. l. 5 from top, behind *menciana* read (44 d e) for (44 e).

P. 298. l. 13 from bottom, behind *tephroxantha* read (49 c) for (49 b).
l. 9 from bottom, behind *jullieni* read (49 c) for (49 d).

P. 299. l. 25 from bottom, behind *alboaccentuata* read (48 h) for (48 f). A. SEITZ.

P. 306. *Lophopteryx camelina* ab. **pallida** *Gillm.* (Arch. Naturg. Güstrow, vol. 64, 1910, p. 36). *pallida.* Only distinguished from the typical form by the lighter colour. Germany. — LAMBILLION (Rev. Mens. Soc. ent. Namur, 1911, p. 45) lately described a light form from Belgium under the same name, with lighter forewing and strongly obliterated markings. Evidently the two forms are identical.

P. 312. *Phalera bucephala Esp.* var. **tenebricosa** *Stertz* (Iris, vol. 26, 1912, p. 26, pl. 2, fig. 5). *tenebricosa.* Forewing uniformly dark mercury grey, the black postdiscal band less dentate than in the typical form, the lunule more rounded. The white discal spot entirely absent. St. Petersburg. K. GRÜNBERG

P. 317. To *Gelastocera.* — As this genus is now placed with the Noctuids among the *Acontianae,* we give a detailed description in Vol. 3, p. 299, and exact figures from nature in Vol. 3, plate 52 l.

P. 331. The reference (56 h) to be omitted behind *Axia vaulogeri* and placed after *A. olga.*

P. 332. Behind *Diloba caeruleocephala* read (49 i) for (49 l).

P. 336. Behind *Somabrachys klugi* omit reference (50 d).
Behind *Somabrachys atrinervis* read reference (50 d). *Somabrachys unicolor* is also figured (50 d) (copy from OBERTHÜR).

P. 337. Behind *kroumira* omit (50 d).

P. 341. l. 9 from bottom, behind *christophi* read (50 a) for (49 a).

P. 345. *Miresa flavescens.* On plate 50 e the long palpi are accidentally not figured, because in the original they were turned down.

P. 354. Behind *Clania minuscula Butl.* omit the reference (56 g).

P. 362. Behind *Eurukuttarus decemvena Hamps.* omit reference (56 g).

P. 373. l. 16 from bottom read *H. striatalis* for *striatialis*. A. SEITZ.

P. 418 and ff. Errata and Addenda to the Cossidae. By Dr. W. ROTHSCHILD.

Cossus balcanicus ist not a slightly different form of *C. cossus*, but a distinct species. It is distinguished by the very pointed forewing, fainter transverse striae, and especially by the black transverse stripe in the outer area, which, instead of being oblique and reaching nearly to vein 1 above the tornus, is parallel with the outer margin, much narrower, and only reaches from vein 7 to just beyond vein 4. The species occurs together whit forms of *Cossus cossus*.

Cossus iranicus *Aust.* resembles *Holcocerus arenicola Stgr.* We give AUSTAUT's description as a foot-note *).

Cossus mongolicus *Ersch.* is not a local form of *Cossus cossus*, but a quite distinct species of *Holcocerus*.

Holcocerus inspersus *Christ.* and **Dyspessa asema** *Püngl.* are so closely allied that in my opinion they decidedly belong to the same genus.

Holcocerus strigatus *Aust.* is closely allied to *nobilis*, but is whiter and much more faintly marked I have a second specimen, identical with the type, from Kushke (Afghanistan) **).

Holcocerus marmoratus *Aust.* is also allied to *nobilis*, but has much sharper markings and larger spots. Beside the type I have a series from Dortkuju near Merv. **).

Holcocerus persicus *Aust.* is allied to *holosericeus*, but is different, having a cream-coloured forewing and light grey hindwing. Beside the type I have a number of examples from Afghanistan ***).

Holcocerus sericeus *Gr. Grsh.* The ♂ figured has nothing to do with *sericeus*. True *sericeus* has a creamy greyish white forewing with three or four small brownish spots between veins 3 and 4. The form figured is without a name, and I propose to call it *strigillata* (description cf. p. 452).

Paropta l-nigrum *Baker* is entirely different from **paradoxa** *H.-Schäff.* The same species, and **henleyi** *Roths.* and **niloticus** *Joann.* are true **Cossus** and have no connection with *Paropta*. The latter genus therefore consists of only three species, *P. paradoxa H. Schäff.*, *P. johannes Stgr.* and my new *confusa* (see p. 452).

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*) "The new species I am describing to-day is the 8th of the genus, and was recently sent to me by Herr ARTHUR SPEYER as coming from Setti-kech in Persia, where a few specimens of it were caught. *Cossus* **iranicus** (this is the name I propose for this novelty, is of the size of a *terebra* ♂, but is more closely allied to *arenicola*, although its wings are comparatively broader and more rounded and its build stouter than in that species. Its forewing is light ashy grey in colour with minute brown reticulations, the following markings being more prominent: (1) a black curved premarginal line connecting the two opposite edges. (2) a second submedian curved line which, towards the inner margin, is lost in the reticulations and from which four rays extend towards the outer margin, crossing the premarginal line mentioned above. Hindwing uniformly grey without distinct reticulations. The fringes like those of the forewing broadly interrupted with brown. Underside whitish, with numerous small brown spots and a few sharper markings, which are very well reproduced in my figure, and which are not found in any other species of *Cossus*. I add that the collar and patagia are edged with light grey, that the lower parts of the thorax is bounded by a white spot, and that the abdomen of this new species bears darker incisions on an ashy grey ground corresponding to the abdominal segments. This rare and remarkable *Cossus*, of which I only posses one ♀, is very different in shape and appearance from all its congeners.

) *Holcocerus* **marmoratus *Austaut* sp. nov. and *Holcocerus* **strigatus** *Austaut* sp. nov. Among the *Holcocerus* sent to me by Herr SPEYER three specimens deserve special attention on account of their peculiar characters. One of them was sent to me as *monticola*, without an author's name, and the others bear the same name but with a query. In fact, these three months are not at all alike, and it appears inopportune to me to unite them as one form. The specimen bearing the label *monticola* is pure but dull white, i. e. without a pearly sheen, the costa of the forewing is uniformly white and on the disc the spots indicating the markings are pale brown. The hindwing is white, at the anal angle suffused with dirty grey. The entire underside of the moth is uniformly white excepting the disc of the forewing, which is suffused with greyish.

The second specimen is a form very different from the preceding. The hindwing is brown with entirely white fringes, and the markings of the forewing are characteristic, differing entirely in size and shape from those of *monticola*. Moreover, these markings also appear in a paler shade on the underside. I name this type **marmoratus**, and believe that it is specifically different from *monticola*, for the two specimens in question are both ♀♀, so that the difference is not sexual, and, as they come from the same locality, they cannot be local varieties of the same species.

As for the insect received under the name of **strigatus**, which name I propose to retain, it is also peculiar in appearance. The entire upper- and underside of the hindwing is dull yellowish white, and the centre of the forewing bears a row of five brown horizontal parallel lines which give an entirely different appearance from the analogous markings of *monticola* and *marmoratus*. The specimen before me is a ♂, but it cannot be regarded as being the ♂ of the previous forms on account of its characteristics, or as a local form on account of the reasons mentioned above. I must add that all these curious *Holcocerus* were discovered at Baira-male (Persia) in a region as yet little explored, where doubtless many interesting discoveries will yet be made.

***) **Holcocerus persicus** *Aust.* nov. spec.? Together with the preceding I recently received from my correspondent several specimens of a species of *Holcocerus*, a genus of small Cossids confined to Central Asia and resembling the European *Hypopta*. Among these moths there were two ♂♂ of the rare and magnificent *Holc. gloriosus Ersch.*, remarkable for its white pearly gloss . . . . . also several ♂♂ of a probably new species which at first glance seems to be identical with *Holcoc. holosericea* from Turkestan: but on closer examination it becomes evident that this Cossid is more stoutly built, larger than the other species of the genus, and that its hindwing is uniformly dirty grey, not so pure white as is characteristic of typical specimens of *holosericea*. The underside of the forewing of the specimens in question is moreover suffused with the same grey in the centre, and the costa bears three small brown spots above towards the apex, which however do not seem to be at all constant. I name this form *persicus*, but refrain from expressing an opinion as to whether it is a distinct species or only a geographical race of *H. holosericea*. (AUSTAUT).

Cossus l-nigrum is distinguished from *henleyi* by the more pointed wings, light yellowish grey ground-colour and sharper and more separate black transverse lines and striae. A special difference is the black longitudinal spot on vein 1, forming the lower part of the L-mark from which the species derives its name.

Cossus niloticus *Joann.* is not the same as *henleyi*; it is much larger, more yellowish brown, with the markings more separate, narrower and more diffuse.

Length of forewing of *henleyi*	♂ 18 mm	♀ 20 mm
,, ,, ,, ,, *niloticus*	♂ 22 mm	♀ 26 mm
Expanse of *henleyi*	♂ 38 mm	♀ 46 mm
,, ,, *niloticus*	♂ 48 mm	♀ 58 mm.

Dyspessa.

D. emilia *Stgr.* Here has been omitted: — **kurdistana** *Bang-Haas.* Larger and with the ground-colour almost white. Djenbekin (Kurdistan).

To **D. clathrata**: — **pallida** *subsp. nov.*, much lighter with the ground-colour almost white. Samarkand.

albosignata *subsp. nov.* Similar to *tristis Bang-Haas*, but the dark markings of the middle of the upper side of the forewing replaced by white. Transcaspia.

suavis *Stgr.* is so different from *jordana* that it must be regarded as a distinct species.

Dyspessa (Cossus) saharae *Lucas* is a large, more ashy grey aberration of *suavis.*

To genus **Zeuzera**: — *stryx Gr.-Grsh.* is not identical with *nubila Stgr.*; it is a well characterised Transcaspian local race, and must stand as — **stryx** *Gr.-Grsh.* Distinguished by the greater expanse and much darker colour of all the dark markings. Ground-colour ashy grey. — **speyeri** *Austaut* is a second local race which is much lighter than *nubila*; light patches whitish grey, dark portions restricted ashy grey. Persia.

Phragmataecia.

P. furia *Gr.-Grsh.* is a well characterised species not in any way allied to *castaneae.* Both wings strongly truncate, blackish brown with yellow edges, and much broader than in *castaneae.*

P. territa *Stgr.* This species is divided into two easily distinguishable local races, but must stand as **albida** *Ersch.*, the two forms differing as follows: **albida** *Ersch.* Ivory white without any dots. ab. **transcaspica**, much smaller, dwarfish. Transcaspia, Central Asia and Shanghai. — **territa** *Stgr.* Ivory to creamy-yellow, with the dark dusting usually fine; Asia Minor (Amasia).

P. roborowskyi is pure ivory white, not sandy yellow.

Cossus.

C. cossus chinensis *subsp. nov.* More uniformly greyish brown, less strongly striated. The black wavy lines not so broad. Collar and patagia uniformly milky white. Tsing-tau. — **armeniaca** *subsp. nov.* The largest form of *Cossus.* Much lighter, forewing suffused with whitish grey; head, collar and thorax whitish grey; abdomen light greyish brown. Hindwing strongly marked with dark grey striae. ♀, length of forewing 48 mm, expanse 108 mm.

C. funkei *Röb.* This species is at once distinguished from *C. cossus* by the uniformly light brownish grey abdomen, the narrow white edge of the patagia, and on the forewing by the subbasal and subterminal dark grey bands and the large central dark grey spots. — Taurus.

C. striolatus *spec. nov.* Antennae, head, thorax and abdomen whitish grey. Forewing greyish white, entirely streaked with brownish grey, the striae merging together to form spots in the centre of the wing. A narrow curved grey line towards the outer margin. Hindwing white. Expanse 44 mm, length of forewing 20 mm.

C. sareptensis *spec. nov.* A small species resembling *Holcocerus*; yellowish wood-brown. Forewing covered with blackish transverse striae; a straight dark band from the apex of the wing to vein 2. Length of forewing 16 mm. — Sarepta.

C. nigrosignatus *spec. nov.* Similar to *tapinus Püng.*, but darker, with yellowish brown, not brownish white hindwing. The striae at the apex of the cell are much closer together, broader, blacker, extending to vein 1; the outer line is curved and not wavy. Length of forewing 20 mm. Akbès (Syria).

C. divisa *spec. nov.* Head, thorax and abdomen light yellowish brownish grey, collar and patagia sandy yellow. The basal two thirds of the forewing are blackish brown with whitish costal spot, and the basal third below the median vein reddish grey brown. Outer third yellowish grey-brown with dark striae and brown costal spots. Hindwing brownish grey. Length of forewing 21 mm. — Panangan (Turkey).

Holcocerus.

H. nigrescens *spec. nov.* Apparently the largest Palearctic species. ♀: head and thorax yellowish grey brown, patagia and sides of thorax edged with black. Abdomen black; basal segment and last two segments mouse-grey. Forewing sooty brownish-grey, apical third wood brown; the entire forewing bearing many large and small black transverse striae, more indistinct in the darker portion. One fifth away from the outer margin a black transverse band. Hindwing blackish brown-grey with darker cloudy transverse striae. Antennae very long, black. Length of forewing 37 mm, expanse 82 mm. — Karagaitan.

H. dilutior *spec. nov.* ♂ similar to *consobrinus*, but the ground-colour reddish sandy yellowish and in the basal two-thirds all coarser markings are absent, so that this part of the wing appears to be only covered with narrow transverse striae; the outer cruciform transverse lines are less strongly developed and not distinctly cross-shaped. Antennae much longer and thinner than in *consobrinus*, extending beyond the middle of the costal margin. Length of forewing 27 mm. Kyssyl.

H. murinus *spec. nov.* ♂ pure yellowish mouse-grey; forewing with indistinct brownish grey dots at the outer margin and at the costa; before the outer margin a slight indistinct brownish transverse line, in the centre of the wing a few dark grey smears between the veins. ♀ lighter grey, marginal spots darker, more strongly developed, the transverse line before the outer margin sharply dark brown, extending from the apex to vein 3, the smears in the middle of the wing developed to form a more or less sharp brown transverse band. Length of forewing 24 mm. — Syr Daria.

H. musculus *spec. nov.* ♂♀ mouse-grey; thorax covered with black scales. Forewing densely suffused with black scales and transverse striae. Length of forewing 15 mm. — Syr Daria.

H. puengeleri *spec. nov.* ♂. Similar to *difficilis*, upperside pure white with brownish yellow markings, a median band composed of spots placed close together, costal and outer marginal spots brownish yellow. The forewing is dusted with small brownish yellow elongate dots. Hindwing pure white with yellowish marginal dots. In the ♀ the markings are much larger and more strongly developed, and more yellowish grey-brown. Length of forewing of ♂ 15 mm, of ♀ 17 mm. — Transcaspia.

Hypopta.

H. tekkensis *Alph.* Greyish brown, forewing of ♂ with chequered outer margin, a white spot beyond the cell, a large white spot on vein 1 and a white band between veins 2 and 6. The ♀ has the forewing uniformly greyish brown with chequered outer margin and a few dispersed small whitish dots. Length of forewing 17 mm. — Transcaspia.

H. sumbannus *Alph.* Similar to *tekkensis*, but with much more strongly developed white markings, so that the grey colour of the wings is reduced to three partially connected broad transverse bands. Length of forewing of ♂ 15 mm, ♀ 19 mm. — Transcaspia.

Paropta.

P. confusa *spec. nov.* ♀. Distinguished from *johannes* at first glance by the brownish grey, not white, hindwing, and by the dark markings of the forewing consisting not of transverse striae, and reticulate black lines of dense straight transverse rows of small dark dots. Length of forewing 24 mm. — Below Sary-mat (Serafshan).

Dyspessa.

D. albina *spec. nov.* ♀: Similar to *aculeata Turati*, but smaller. Pure milky white. Length of forewing 15 mm. — Baldshuan (Turkestan).

D. curta *spec. nov.* Distinguishable by the short stumpy shape, as well by the extraordinarily stout body and convex rounded outer margin of the forewing. Ashy grey; a dark grey, oblique transverse band running inward from before the apex to the origin of vein 2; a broad whitish grey band at the inner side of this band. Rows of dark grey spots at the costal and outer margins. Length of forewing 17 mm. — Prov. Kuliab (Afghanistan).

D. affinis *spec. nov.* Similar to *kabylaria Bang-Haas*, but on the forewing almost the entire median cell, a large smear on vein 2 and a large spot with brown median streak on vein 1 are white. — Karagaitan.

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1 h	,,	volgensis	,,	*volgersis*
2 a	,,	leptalina	,,	*leptatina*
2 c	,,	euchromioides	,,	*cuchromoides*
3 d	,,	maerens	,,	*mocrens*
4 h	,,	contamineoides	,,	*contaminoides*
5 f	,,	manni	,,	*mannii*
6 a	,,	**aeacus**	,,	*icterica*
6 b	,,	**icterica**	,,	*acacus*
6 b	,,	**prinzi**	,,	*aurantiaca*
7 e	to separata add:		transitus	
7 f	read:	**erschoffi** ♂	for	*karatcgini* ♂
8 i	,,	**minor**	,,	*minima*
9 e	,,	cyssea	,,	*cypsca*
9 f	,,	**rubrozonata**	,,	*leucoma*
11 a	,,	acerba	,,	*aecrea*
11 b	,,	torrens	,,	*torreus*
11 c	,,	venata	,,	*reneta*
11 d	,,	carnipicta	,,	*carncipicta*
11 i	,,	irrorella	,,	*irrovella*
11 i	,,	nickerli ♂	,,	*nickerlid*
11 l	,,	**brunnea**	,,	*fumida*
12 k	,,	alheola	,,	*lactcola*
12 l	,,	flavociliata	,,	*flaviciliata*
15 a	,,	ferghana	,,	*fergana*
15 a	,,	lubricipeda	,,	*lupricipeda*
15 a	,,	**totinigra**	,,	*unicolor*
15 f	,,	paucipuncta	,,	*paucipunctata*
16 k	,,	ferghana	,,	*fergana*
18 e	,,	**insubrica**	,,	*bithynica*
19 c	,,	thyellina ♀	,,	*thyeltina* ♂
20 f	,,	**iris**	,,	*obsoleta*
21 c	,,	**niphonis** ♀	,,	*squamosa*
22 f	,,	**felderi**	,,	*gloriosa*
23 b	read:	varians	for	*pusilla*
23 i	,,	oranaria	,,	*oranula*
24 a	,,	longespinata	,,	*longispinata*
25 f	,,	**sapiens**	,,	*davidis*
26 a	,,	**palaestinensis**	,,	*josua*
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47 g	,,	**straminea**	,,	*pallida*
47 g	,,	**longipennis**	,,	*straminca*
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